

PC 10 III 20 III

User's Manual
English

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 **Commodore**

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USER'S MANUAL STATEMENT

WARNING:

This equipment has been certified to comply with the limits for a Class B computing device, pursuant to subpart J of Part 15 of the Federal Communications Commission's rules, which are designed to provide reasonable protection against radio and television interference in a residential installation. If not installed properly, in strict accordance with the manufacturer's instructions, it may cause such interference. If you suspect interference, you can test this equipment by turning it off and on. If this equipment does cause interference, correct it by doing any of the following:

- Reorient the receiving antenna or AC plug.
- Change the relative positions of the computer and the receiver.
- Plug the computer into a different outlet so the computer and receiver are on different circuits.

CAUTION: Only peripherals with shield-grounded cables (computer input-output devices, terminals, printers, etc.), certified to comply with Class B limits, can be attached to this computer. Operation with non-certified peripherals is likely to result in communications interference.

Your house AC wall receptacle must be a three-pronged type (AC ground). If not, contact an electrician to install the proper receptacle. If a multi-connector box is used to connect the computer and peripherals to AC, the ground must be common to all units.

If necessary, consult your Commodore dealer or an experienced radio-television technician for additional suggestions. You may find the following FCC booklet helpful: "How to Identify and Resolve Radio-TV Interference Problems." The booklet is available from the U.S. Government Printing Office, Washington, D.C. 20402, stock no. 004-000-00345-4.

Part.-Nr. 319964-02 R

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1. INTRODUCTION

ABOUT THE COMMODORE® PC10/PC20

The Commodore PC personal computer series offers outstanding computing power and versatile graphics capabilities at an affordable price. This series offers a range of configurations to suit your needs, including the PC10 (with dual floppy drives) and the PC20, which comes with a single floppy drive and a 20 MB (megabyte) hard disk.

Right out of the box, the PC10/PC20 computers are fully equipped with all the internal memory, disk storage capacity and graphics handling capabilities needed to run the MS-DOS® Operating System and IBM® PC-compatible software, including other PC-compatible operating systems. Many items that are optional on other computers are standard on the Commodore PC10/PC20. In addition, the flexible open-architecture design supports the easy installation of a variety of options — now, and in the future.

All configurations include an 8088-1 microprocessor capable of running at three speeds—4.77, 7.16 and 9.54 MHz. All configurations provide 640 KB (kilobytes) of internal RAM. The motherboard incorporates an advanced-design video controller chip that handles MDA, CGA, Hercules® and Plantronics® displays. Also built into the motherboard are a hard disk interface and interfaces for mouse, parallel (Centronics) and serial (RS 232) ports. There are three internal PC-XT® type expansion slots and an onboard battery-powered clock/calendar.

The versatility of the built-in video controller lets you immediately select from a wide range of software packages, monitor types and display formats — **without** having to buy and install one or more optional graphics cards, each of which could cost up to several hundred dollars.

The built-in hard disk interface is designed for use with an XT-type hard disk drive. Because this interface is an integral part of the motherboard, no expansion slot is required. See your Commodore dealer for details.

The combination of fast processing speed, large internal memory, disk-storage options, mouse interface and flexible graphics-handling capability makes the Commodore PC10/PC20 ready and able to run MS-DOS and popular IBM PC-compatible software products, such as Windows®, Lotus 1-2-3®, dBASEIII®, Word 3®, Sidekick®, and more.

Because the PC10/PC20 design includes parallel and serial ports, you can connect either or both types of printer—again without having to buy and install special expansion cards. You can also use the serial port to plug in an external modem.

The PC10/PC20 BIOS is auto-configuring—that is, it recognizes what expansion cards are installed, and adjusts the I/O addresses automatically.

The high-efficiency power supply reliably supports all the factory-installed features and provides the capacity to handle add-ons, including options installed in the expansion slots. For instance, you could use one expansion slot to add an internal modem and another expansion slot for a tape back-up unit for a hard disk.

MS-DOS 3.2 and GW-BASIC® are provided on the two floppy disks included with your system. GW-BASIC contains all the commands and supports all the features of IBM BASIC and BASICA. IBM BASIC and BASICA are for use only with IBM PCs and are included only on IBM PC-DOS® floppy disks.

KEY FEATURES

Here's a summary of the major features of the Commodore PC10/PC20:

- **8088-1 microprocessor; 4.77, 7.16 or 9.54 MHz clock speed**
- **640 KB internal RAM**
- **PC-XT compatible BIOS**
- **AUTOCONFIG™** — automatically recognizes and accommodates expansion cards
- **Built-in video controller chip** — provides versatile monochrome/color display capabilities, compatible with MDA, CGA, Hercules and Plantronics displays.
- **Disk storage for PC10:**
 - Two 5¼ inch 360 KB floppy disk drives
- **Disk storage for PC20:**
 - One 5¼ inch 360 KB floppy disk drive
 - 20 MB 3½ inch hard disk drive
- **Hard disk interface on motherboard** — when used with an XT-type hard disk, eliminates the need for a separate hard disk controller in one of the expansion slots
- **3 full-size PC-XT internal expansion slots**
- **Socket for optional 8087 math coprocessor**
- **Battery-powered clock/calendar**
- **Microsoft® compatible mouse port** (optional Commodore 1352 mouse)
- **RS-232 serial port**
- **Centronics parallel port**
- **Enhanced 101 key (ASCII)/102 key (international) keyboard with full PC-AT® compatibility**
- **High-efficiency power supply with fan**—supports up to 2 floppy drives, a hard drive, and 3 expansion cards

ABOUT YOUR COMMODORE PC10/PC20 USER DOCUMENTATION

The documentation supplied with your Commodore PC10/PC20 includes:

- **Commodore PC10/PC20 Operations Guide**
This is the book you are now reading. It introduces the Commodore PC10/PC20, shows how to unpack and set up the PC10/PC20 equipment and how to connect peripheral equipment, tells how to get started by loading the MS-DOS Operating System, and provides selected technical information in appendices.
- **Commodore PC MS-DOS User's Guide/User's Reference**
These two books (which may be bound together in one volume) define the major elements of MS-DOS, tell you what you need to know to load prepackaged software products (such as Lotus 1-2-3) and give detailed information on all MS-DOS commands and functions. (For details on running a specific software product, see the instructions supplied with that product.)
- **Commodore PC GW-BASIC Interpreter User's Guide/User's Reference**
These two books (which also may be bound together in one volume) provide detailed information on all the elements of GW-BASIC. This material is primarily a reference tool for GW-BASIC users, and assumes some prior knowledge of the BASIC programming language.

2. UNPACKING AND SETTING UP YOUR EQUIPMENT

*** IMPORTANT ***

Before you try to connect or turn on any of the equipment in your Commodore PC10/PC20 system, be sure to read ALL the unpacking and setup instructions in this chapter.

CHECKING WHAT YOU RECEIVED

MAKE SURE that you received at least the following items:

- The **SYSTEM UNIT** with power cable
- The detachable **KEYBOARD** with connecting cable
- **Documentation**, including:
 - Commodore PC10/PC20 Operations Guide
 - Commodore PC MS-DOS User's Guide/User's Reference
 - Commodore PC GW BASIC Interpreter User's Guide/User's Reference
- **MS-DOS system software and GW-BASIC software on disk**

Check the computer box for these items. If any item is missing, contact your dealer immediately.

Save the boxes and packing material. They will provide protection for the equipment if you move it.

PICKING A SPOT FOR YOUR COMPUTER

When you set up your computer equipment, pick a spot away from heat, dust, smoke or electrical interference. If possible, plug your Commodore PC10/PC20 equipment into a separate circuit.

SETTING UP AND CONNECTING THE EQUIPMENT

The minimum equipment required for a Commodore PC10/PC20 system installation includes the following:

- System Unit
- Detachable Keyboard
- Monitor

As noted above, the System Unit and the Keyboard are included in the computer package. You must supply the monitor, which can be either monochrome or color.

The following paragraphs tell how to connect the various types of equipment that can be included in a Commodore PC10/PC20 system.

*** CAUTION ****

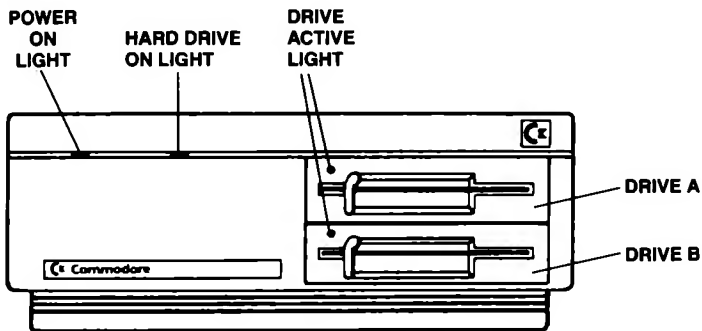
Before making any connections, make sure that the power switches of all units are turned OFF and that the power cables are not plugged into an electrical outlet.

THE SYSTEM UNIT

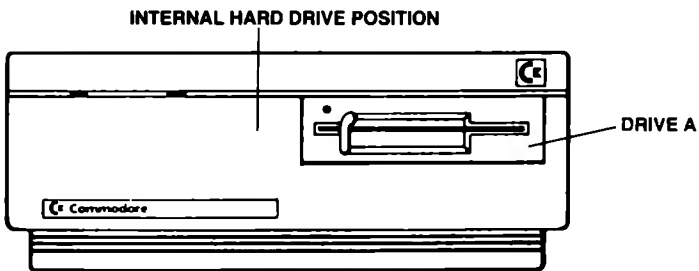
The System Unit contains the actual computer circuitry and disk drive(s). The number and kind of disk drives in the unit depends on what Commodore PC10/PC20 configuration you have purchased. There are several types of disk drives available for use with a Commodore PC10/PC20:

- **Floppy disk drive(s)—5¼ inch 360 KB.**
There are two of these drives on a PC10; there is one floppy drive on the PC20. The floppy drive(s) are located on the front of the System Unit, at the far right. (See Figure 2-1.) The upper drive is designated Drive A:. The second drive (on a PC10) is located just below the first, and is designated Drive B:.
- **Hard disk drives—3½ inch/5¼ inch.**
A 3½ inch XT-type drive, designated Drive C:, is standard equipment on the PC20; an XT-type drive can be installed as an option on the PC10. The hard disk is normally installed in a vertical position to the left of the floppy drives. (See Figure 2-1.) If there is only one floppy drive, it is also possible to install a hard disk in a horizontal position in the bottom floppy drive (Drive B:) position.

Figures 2-1 through 2-4 show the front, back and sides of the PC10/PC20 System Unit and identify the various components of the unit. The front of the unit contains a power light indicator, disk drive activity lights for both floppy and hard disk drives, and the actual disk drives. The back contains the power switch, the power socket, video configuration switches, monitor connectors, various other connectors and ports, and screws that fasten down the System Unit cover. The right side contains the keyboard cable socket, the reset switch, and cover screws. The left side contains only cover screws.



PC10 CONFIGURATION



PC20 CONFIGURATION

FIGURE 2-1. COMMODORE PC10/PC20 — FRONT VIEW

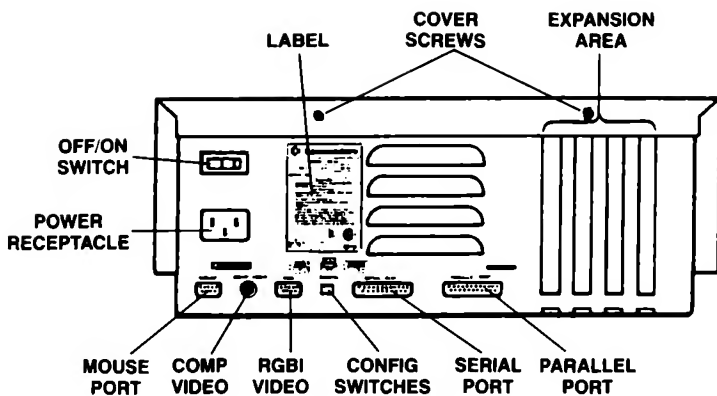


FIGURE 2-2. COMMODORE PC10/PC20 — REAR VIEW

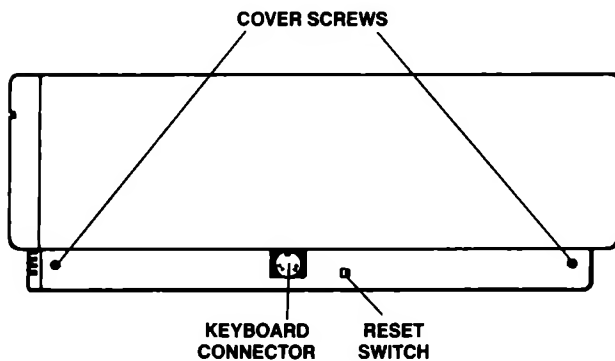


FIGURE 2-3. COMMODORE PC10/PC20 — RIGHT SIDE VIEW

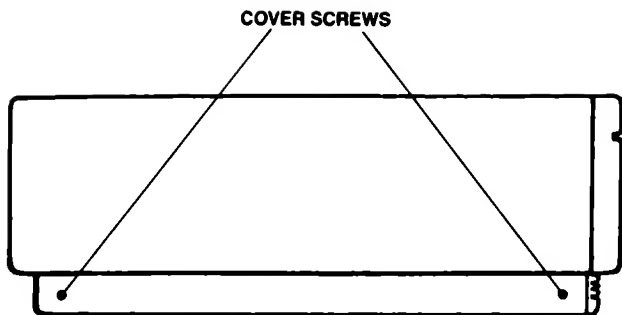


FIGURE 2-4. COMMODORE PC10/PC20 — LEFT SIDE VIEW

Included with the System Unit is a power cable. This cable has a 3-pin female connector at one end and a 3-prong power plug on the other end. Plug the end with the female connector into the power socket on the back of the System Unit (see Figure 2-2). Plug the 3-prong power plug into a 3-hole electrical outlet.

NOTE: Make sure that your PC10 or PC20 matches the electrical requirements for the country in which you are using the computer. For example, you cannot use a 110/120 volt model in countries having 220 volt systems. If in doubt about hookup requirements, consult your dealer.

CONNECTING THE KEYBOARD TO THE SYSTEM UNIT

The Keyboard is similar to a typewriter keyboard but has additional keys, including a set of function keys at the top, a cursor keypad just right of the typing keys, and a numeric keypad on the far right .

You use a special coiled cable to plug the Keyboard into the System Unit. One end of this cable is permanently connected to the Keyboard, while the other end is free. There is a 5-pin DIN plug on the free end. To connect the Keyboard to the System Unit, insert the DIN plug on the free end of the keyboard cable into the Keyboard Connection Socket on the right side of the System Unit (see Figure 2-5).

NOTE: See USING THE KEYBOARD at the end of this chapter and Appendix J for information on using the keyboard.

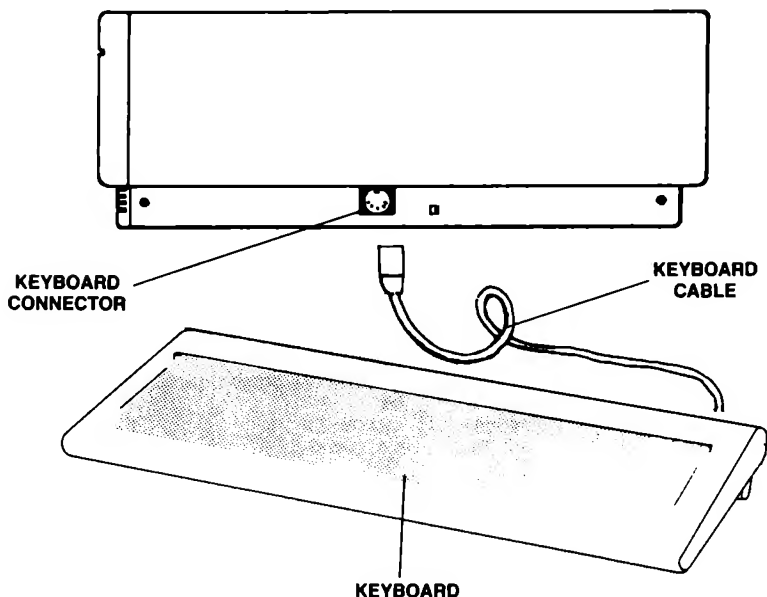


FIGURE 2.5. CONNECTING THE KEYBOARD TO THE SYSTEM UNIT

CONNECTING A MONITOR TO THE SYSTEM UNIT

You display your computer information on a video monitor, which looks something like a small television set. The actual connection between the System Unit and the Monitor depends on what make of monitor you are using. You can use either a composite color or monochrome monitor, a TTL monochrome monitor, or a color RGBI monitor.

NOTE: When making monitor connections, be sure to **TURN OFF THE POWER** to both the computer and the monitor.

Connecting a Composite Monitor

To connect a composite monitor (color or monochrome) to the PC10/PC20, you will need a cable with a standard phono plug on each end. Insert one end of the cable into the output connector on the monitor, and insert the other end into the jack marked **COMP VIDEO** on the back of the System Unit (see Figure 2-2).

NOTE: See Appendix D for composite monochrome jumper switch settings. Also, color composite is only available in Color 40 mode.

Connecting a Color RGBI or Monochrome TTL Monitor

To connect a color RGBI or monochrome TTL monitor to the PC10/PC20, you will need a cable with a 9-pin D connector on one end. Insert this connector into the RGBI connector on the rear of the System Unit (see Figure 2-2). Note that you must fasten down the D connector with two screws. Insert the other end of the cable into the video input connector on the monitor.

For information on setting the PC10/PC20 to provide the proper type of display for your monitor, see **VIDEO MODES AND HOW TO SET THEM** in Chapter 3.

CONNECTING A MOUSE TO THE SYSTEM UNIT

The Commodore PC10/PC20 includes a mouse connector which is compatible with the Commodore 1352 mouse. A mouse is a small hard ball enclosed in a palm-sized housing, with a cable that plugs into the computer. You use the mouse to move from place to place on the monitor screen. The mouse has two buttons that are used to select program functions and capabilities.

To connect a mouse to the System Unit, first make sure that all packing material is removed from the mouse. Then insert the free end of the mouse cable into the connector marked MOUSE on the back of the System Unit (see Figure 2-2).

CONNECTING EXTERNAL PERIPHERALS

In addition to a video monitor and a mouse, you can connect various other types of external equipment (known as peripheral equipment, or simply peripherals) to your Commodore PC10/PC20 computer. Here's a brief description of how to connect some of the most popular types of peripherals. For more details on these connections, see the technical or installation manuals supplied with the equipment.

CONNECTING A PARALLEL PRINTER

You connect a parallel (Centronics) printer to a Commodore PC10/PC20 through the connector marked PARALLEL PORT on the back of the System Unit.

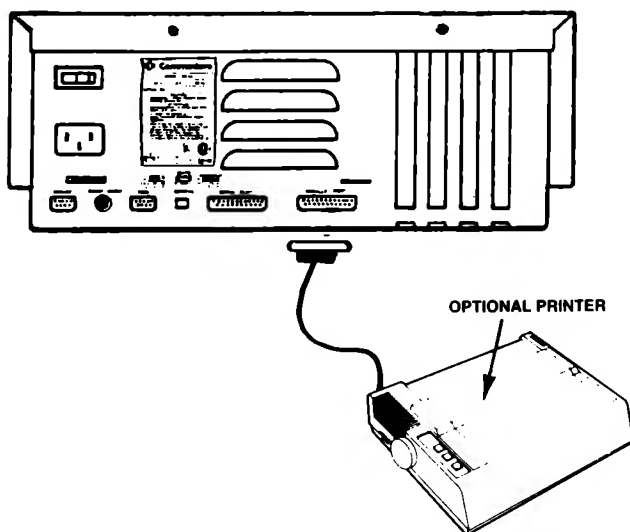


FIGURE 2-6. CONNECTING A PARALLEL (CENTRONICS) PRINTER TO THE SYSTEM UNIT

CONNECTING A SERIAL PRINTER

You connect a serial (RS232) printer to a Commodore PC10/PC20 through the port marked SERIAL PORT on the back of the System Unit.

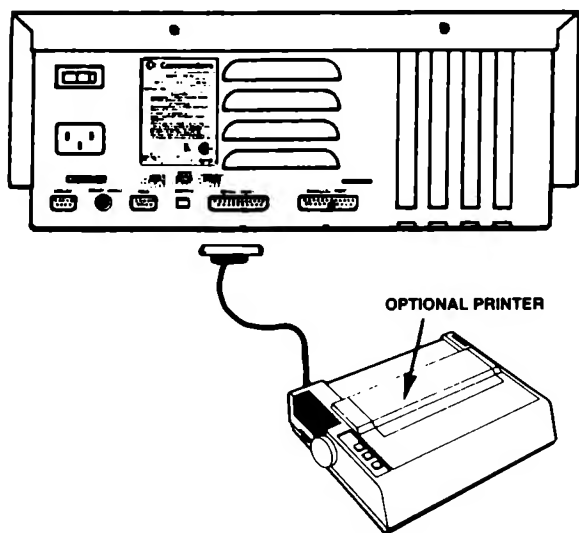


FIGURE 2-7. CONNECTING A SERIAL (RS232) PRINTER TO THE SYSTEM UNIT

CONNECTING AN EXTERNAL MODEM

You can connect an external modem to a Commodore PC10/PC20 through the SERIAL PORT on the back of the System Unit.

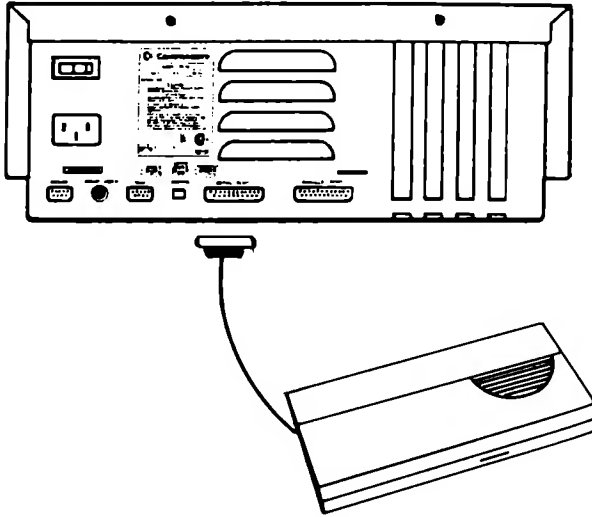


FIGURE 2-8. CONNECTING AN EXTERNAL MODEM TO THE SYSTEM UNIT

DISK DRIVE EXPANSION

Expansion kits for both floppy and hard disk drives are available from your Commodore dealer. You can install the hardware right in the System Unit. Each kit contains complete step-by-step instructions for the installation.

USING THE PC10/PC20 INTERNAL EXPANSION SLOTS

In addition to connecting external peripherals to your Commodore PC10/PC20 computer, you can insert optional expansion cards in the three internal expansion slots located in the left rear section of the System Unit (see Figure 2-9). Typical expansion items include specialized graphics cards and controllers for tape backup systems for the hard disk.

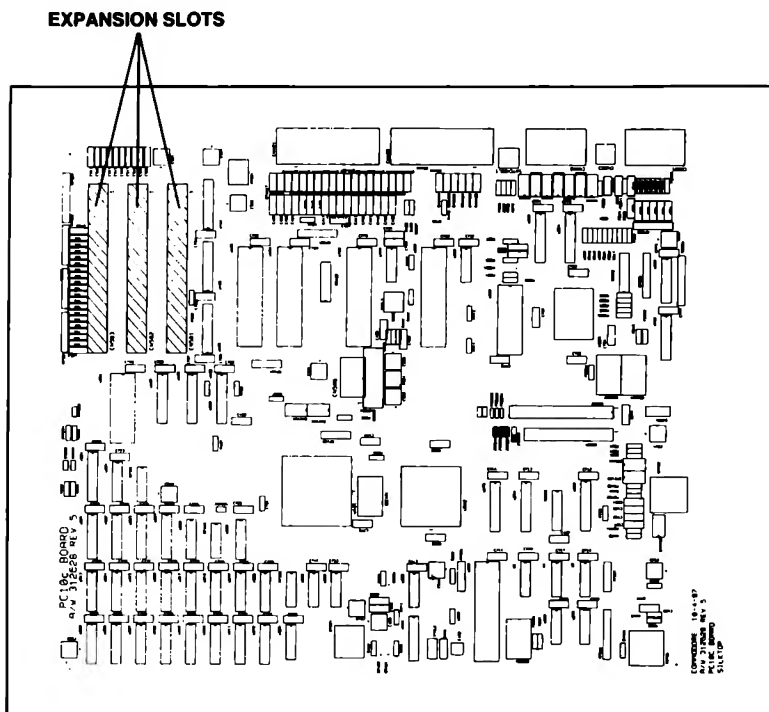


FIGURE 2-9. LOCATION OF INTERNAL EXPANSION SLOTS IN THE SYSTEM UNIT

The general procedure for installing an expansion card is as follows:

1. Remove the six screws on the rear and sides of the System Unit. (See Figures 2-3 through 2-4 for the locations of the screws.)
2. Slide the cover of the System Unit backward and off.
3. Insert the expansion card in the selected expansion slot (see Figure 2-9), and then connect cables as required (including making a connection to the power supply).

For the specific procedure to follow in installing and using a particular expansion card, see the instructions supplied with the card and/or consult your dealer.

USING THE KEYBOARD

The PC10/PC20 keyboard is an enhanced AT style keyboard with 101 keys in the U.S. (ASCII) version or 102 keys in the International version. There are four main sections on the keyboard: a typing area occupying the left two thirds of the keyboard; a set of 12 function keys located above the typing area; a numeric keypad at the far right; and some special keys, including a cursor keypad, located between the typing area and the numeric keypad.

Following are descriptions of some keys you will need to know about to get started using your PC10 or PC20 computer. For detailed information on the layout and use of the Commodore PC10/PC20 Keyboard, see Appendix J of this manual. Also see Chapter 1 in the MS-DOS User's Guide, and Chapter 5 and Appendix C in the MS-DOS User's Reference manual.

THE ENTER (RETURN) KEY

One of the uses of the keyboard is to type commands. You transmit a command to the computer by typing the command and pressing the Enter key (the key with the right-angled arrow symbol on top, located at the right end of the main keyboard, in the third row from the bottom). This key is sometimes referred to as a Return key or a Carriage Return (CR) key. There is also an Enter key in the Numeric Keypad.

Note: In software that supports the use of a mouse, the left mouse button generally acts like the Enter key in selecting and activating program commands.

USING THE CURSOR KEYS TO MOVE AROUND THE SCREEN

The cursor keys let you move up, down, left and right on the screen. There are two sets of cursor keys. The main cursor keys are clustered in a keypad between the typing area and the Numeric keypad. Each key has an arrow indicating the direction in which the cursor moves when that key is pressed. In the numeric keypad, the cursor can also be moved by pressing the 2, 4, 6 and 8 keys with the Num Lock key off. The cursor moves in the direction of the arrow shown on the key. If the Num Lock is on, you can still move the cursor by pressing the Shift key and 2, 4, 6 or 8 key.

NOTE: In software that supports the use of a mouse, the cursor can usually be moved with the mouse.

CORRECTING A TYPING MISTAKE

If you make a mistake when you are typing, you can simply backspace over the mistake and retype. As you move the Backspace key (the key with an arrow pointing left, located at the right of the top row of the typewriter area of the keyboard), you will notice that the characters to the left of the key disappear.

WHAT'S NEXT?

Now that you have unpacked and set up your equipment and checked the connections thoroughly, you are ready to begin computing. The next chapter gets you started by introducing you to the MS-DOS software you will use to control the operation of your Commodore PC10/PC20.

3. GETTING STARTED

WHAT TO DO FIRST

To start using your Commodore PC10/PC20 computer, you must first load an **operating system** such as **MS-DOS** into your computer. The following paragraphs explain what all this means.

WHAT IS AN OPERATING SYSTEM?

An operating system (OS) is special software that acts as an intermediary between you and the computer. It provides the **interface** (that is, it allows interaction) between the hardware, the user (you) and the other software, such as programming languages like BASIC and applications programs like word processors and spreadsheets. The operating system manages and supervises your computer and its resources, including internal memory, external memory access, and communications with peripheral devices such as printers and modems.

WHAT IS MS-DOS?

MS-DOS is an operating system created by Microsoft® Corporation. Because MS-DOS manages disk storage devices, it is referred to as a disk operating system or a DOS. Because MS-DOS is highly compatible with PC-DOS® (the operating system used by the IBM® PC), your Commodore PC10/PC20 is able to run popular software packages available for the IBM PC.

On the PC10, MS-DOS is supplied on a floppy disk known as the System Disk. This disk is also included as part of your Commodore PC10/PC20 package, but on the PC20 MS-DOS is also factory-installed on the hard disk. MS-DOS includes two kinds of information, in the form of commands:

- **Internal commands**—These are commands that are placed into your computer's memory when MS-DOS is started or loaded. These commands remain in the computer's memory until the computer is turned off. Internal commands are therefore always directly available to you when you are using the computer.

- **External commands**—These are commands that are on the System Disk or hard disk, but are NOT automatically read into the computer's memory when MS-DOS is loaded. Whenever you want to use one of these commands, you must access the System Disk.

STARTING OR BOOTING MS-DOS

Starting MS-DOS (also referred to as **booting** or **loading** MS-DOS) is the process of copying the MS-DOS internal commands into the computer's memory. These commands are contained on the floppy MS-DOS System Disk, and also on the hard disk if you have a PC20.

You can boot MS-DOS from the floppy System Disk, or from a hard disk if MS-DOS has been installed on it. The following procedure tells how to boot from the floppy disk. (See pages 38-39 and Appendix M for information on installing MS-DOS on a hard disk and booting MS-DOS from a hard disk.)

BOOTING MS-DOS FROM A FLOPPY SYSTEM DISK

Follow this procedure when you first start to "boot" MS-DOS from a floppy System Disk:

1. **CHECK THAT YOU HAVE REMOVED ALL PACKING MATERIALS FROM THE EQUIPMENT.**

Make sure that you have removed the transport card(s) from the floppy disk drive(s). Save the card(s) in case you have to move the System Unit at some future time.
2. **CHECK THAT THE SYSTEM UNIT IS PROPERLY CONNECTED TO THE KEYBOARD, THE MONITOR AND THE ELECTRICAL POWER SOCKET.**
3. **CHECK THAT THE SYSTEM UNIT IS PROPERLY CONNECTED TO ANY PERIPHERAL EQUIPMENT YOU MAY BE USING, SUCH AS A MOUSE OR PRINTER.**
4. **TURN ON THE MONITOR.**

Press the power switch on the monitor. For most monitors, a power indicator light on the front of the monitor glows when the power is turned on.

5. MAKE SURE THAT THE SYSTEM DISK HAS A WRITE-PROTECT TAB OVER THE NOTCH ON ITS SIDE.

The write-protect tab protects the information on the System Disk from being accidentally replaced or written over. If the tab is removed, the disk is in the write-enable mode. (See Figure 3-1.)

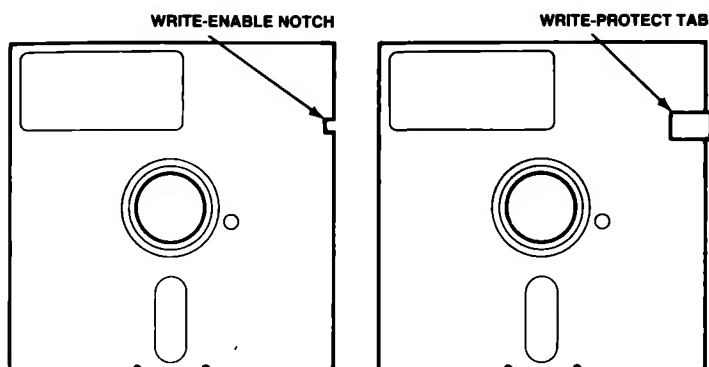


FIGURE 3-1. WRITE-PROTECT TAB

6. REMOVE THE SYSTEM DISK FROM ITS PROTECTIVE SLEEVE AND INSERT THE DISK INTO DRIVE A:.

Drive A: is located on the right side of the System Unit. If there are two floppy drives, it is the upper drive (see Figure 3-2).

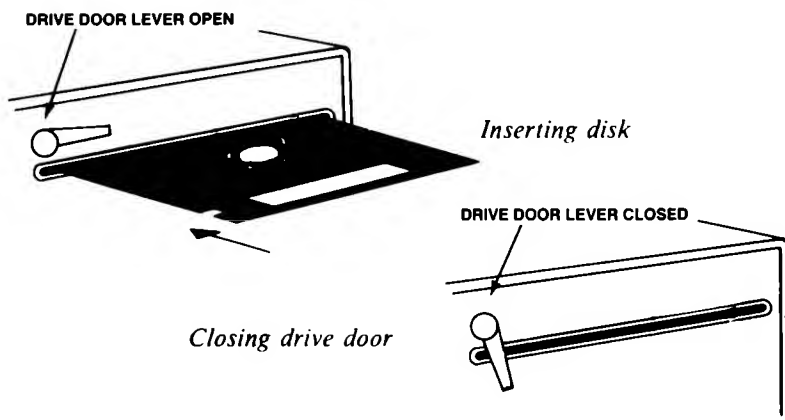


FIGURE 3-2. INSERTING THE SYSTEM DISK

WARNING

DO NOT CLOSE THE DRIVE DOOR WHEN THERE IS NO DISK IN THE DRIVE. DOING SO CAUSES THE DRIVE DOOR TO LOCK, AND YOU MAY NOT BE ABLE TO REOPEN IT. (If you are not familiar with handling floppy disks, see the section in Chapter 1 of the MS-DOS User's Guide on the use and care of floppy disks.)

7. CLOSE THE DOOR LEVER ON THE FRONT OF DRIVE A:.
8. TURN ON THE SYSTEM UNIT.

Press the power switch on the rear of the System Unit. After a short time the computer accesses the System Disk in Drive A: and the red light on the front of that drive comes on, indicating that the disk is being read. In a few seconds the "booting" or loading of MS-DOS is completed, and the opening MS-DOS screen display appears.

WARNING

DO NOT ATTEMPT TO REMOVE ANY DISK WHILE THE DISK DRIVE LIGHT IS ON. DOING SO MAY DAMAGE THE INFORMATION ON THE DISK.

NOTE: After you finish booting MS-DOS, you should make a backup copy of the MS-DOS System Disk and use the copy for all later sessions. Put the original in a safe place. See the sections in this chapter entitled HOW TO PREPARE DISKS FOR USE WITH MS-DOS and HOW TO BACK UP YOUR DISKS for instructions on making a backup copy of a disk.

If you have a Commodore PC10 equipped with an optional hard disk, you will only need to use the above procedure for the first time that you load MS-DOS, provided that you copy MS-DOS permanently to the hard disk. Thereafter, MS-DOS will boot automatically whenever you turn on the system.

THE OPENING SCREEN DISPLAY

When MS-DOS is first “booted” or “loaded”, you will see a number of messages displayed in succession on your monitor screen. After a few seconds you should see a display like this on the screen:

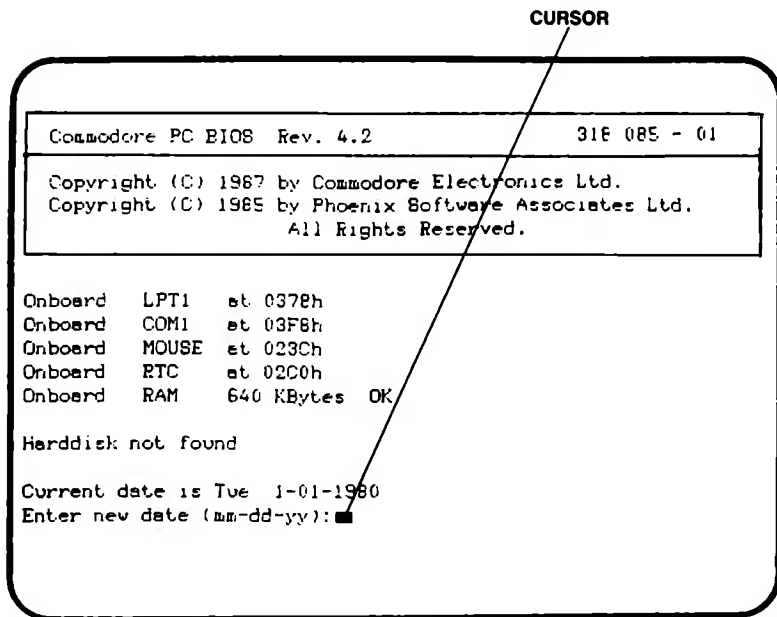


FIGURE 3-3. THE OPENING SCREEN DISPLAY

What the Opening Screen Messages Mean

When you first turn on the computer a number of messages appear on the screen in succession. First comes a series of messages telling what the current system configuration is (e.g., what features or ports are enabled, etc.). Next comes a *RAM test* message, indicating the results as the computer tests the internal random access memory. Unless the computer encounters a problem and indicates an error of some sort, you ordinarily need not be concerned with these messages. Appendix K, AUTOCONFIG, provides detailed information on the system configuration process and messages.

The Cursor

Notice the small flashing rectangle on the screen, just to the right of the last item of information on the screen. This rectangle is called the **cursor**. The cursor marks your position on the screen. When you type in something or when the computer responds to something you have typed in, the cursor moves accordingly. You can move the cursor around the screen by using the cursor keys. (See USING THE KEYBOARD on page 17 and Appendix J for more information on the cursor.)

Adjusting the Screen Display

If the screen display is not clear, use the screen controls on your monitor to adjust the display. If you don't get a picture at all, check your connections and verify that the switch settings match your monitor type.

Other Screen Messages

You may at times see various messages on the screen (e.g., Non-DOS disk error). These messages are the computer's way of telling you that MS-DOS doesn't have enough information to act on. In many cases the messages are self-explanatory, but in some cases you may need a more detailed explanation of the message. Appendices D and E of the MS-DOS User's Reference manual list the error messages for the PC10/PC20.

SETTING THE DATE AND TIME IN MS-DOS

When the computer finishes loading MS-DOS from the System Disk, several messages are displayed on the screen, as shown in Figure 3-3. The first messages give system information and copyright notices. Eventually a message giving the date held in MS-DOS is displayed, followed by the prompt "Enter New Date:", with the cursor blinking to the right of the prompt. You can then either set the date, or you can ignore the prompt by just pressing Enter when the date prompt appears. The date prompt is followed by a time prompt, which you can handle in the same way as the date prompt.

HOW TO RESPOND TO THE DATE AND TIME PROMPTS

1. Type the date in the correct format for your country. For example, if you are using a mm-dd-yy format and the date is September 6, 1988, type the following and press **Enter**:

9-6-88

If the date is already correct, or you do not want to answer this prompt, press the Enter key to move to the next step.

2. Type the time in an hh:mm format, using 24-hour time. For example, if it is 1:30 p.m., type the following and press **Enter**:

13:30

If the time is already correct, or you do not want to answer this prompt, just press the Enter key to move to the next step.

Once you have set these values you can send them to the hardware clock/calendar, which will then keep the correct time and date even with the computer turned off. See the description of the SETCLOCK command on page 28 for details on how to do this.

If you make a mistake when you are typing the date or time, simply backspace over the mistake and retype. If you have already pressed the Enter key and sent incorrect date or time values to MS-DOS, you can correct them by typing DATE to change the date and TIME to change the time. (Remember to press the Enter key after you type each command.) Then enter the correct values when the date and time prompts appear.

For more instructions on using the MS-DOS DATE and TIME commands, refer to Chapter 3, page 18 of the MS-DOS User's Guide.

THE MS-DOS PROMPT

After you respond to the time and date prompts (either by entering the date and time, or by pressing the Enter key when you see each prompt), your screen should show the MS-DOS prompt as in Figure 3-4.

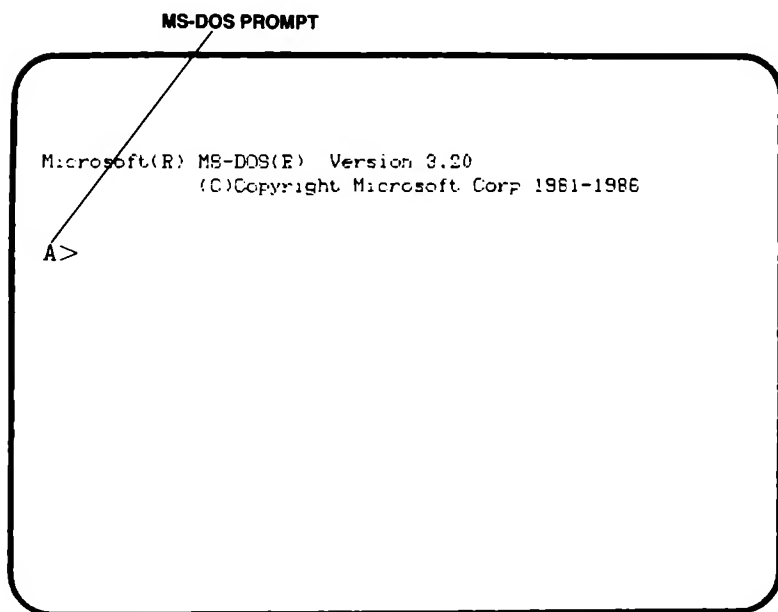


FIGURE 3-4. THE MS-DOS PROMPT

In Figure 3-4, the characters **A>** together form the MS-DOS prompt. When you see the MS-DOS prompt, MS-DOS is saying "Tell me what to do."

The letter **A** in the prompt indicates that you are working with Drive A: (that is, whatever letter is in the prompt identifies the currently active drive). You can change the prompt by typing the characters **B:** following the **A:** prompt, and then pressing Enter. The prompt would then change to **B>**.

If you are using a hard disk, the prompt is **C>**. However, to use MS-DOS with a hard disk, your hard disk must first be formatted (if it is not a factory-prepared hard disk). See **INSTALLING MS-DOS ON A HARD DISK** later in the chapter and Appendix F in the MS-DOS User's Reference for information on how to install MS-DOS on a hard disk.

SETTING THE REAL-TIME CLOCK/ CALENDAR WITH THE SETCLOCK COMMAND

The Commodore PC10/PC20 contain a real-time battery-operated clock/calendar that, once set, maintains the correct date and time even with the computer turned off. By using the SETCLOCK command, you can read and write date and time values between MS-DOS and the hardware clock/calendar.

When you first boot MS-DOS, you should respond to the date and time prompts and set the actual date and time values. Then you can send these values to the clock/calendar hardware by following this procedure:

1. Make sure the MS-DOS prompt is showing on the screen.
2. Type the following command and press Enter:

SETCLOCK -W

The clock/calendar hardware will then keep the correct date and time, even while the computer is turned off.

Whenever you boot MS-DOS in the future, you can use the SETCLOCK -R command to read the actual date and time from the hardware clock/calendar to MS-DOS by following this procedure.

1. Make sure the MS-DOS prompt is showing on the screen.
2. Type the following command and press Enter:

SETCLOCK -R

In using these commands, you must type the word **SETCLOCK**, followed by a **space**, a **dash**, and then either an **R** (for **read**), or a **W** (for **write**).

NOTE: Each time you turn on the computer and boot MS-DOS you are prompted to set the date and time. If you don't do this (either by using SETCLOCK -R, or by responding to the MS-DOS date and time prompts), the system uses default values that are available each time MS-DOS is booted. You can change this sequence by creating a special file that automatically reads the hardware clock/calendar time and date into MS-DOS whenever you boot the system. See CUSTOMIZING THE MS-DOS STARTUP SEQUENCE WITH AN AUTOEXEC.BAT FILE on page 41.

WHAT'S ON THE DISK?

To see the contents of the MS-DOS System Disk, follow these steps:

1. IN RESPONSE TO THE A> PROMPT, TYPE:

DIR

(NOTE: In response to MS-DOS prompts, you can usually type all upper case or all lower case letters, or a combination of both.)

2. PRESS THE ENTER KEY.

Your screen will change and will look something like Figure 3-5.

DIR is a command that tells the computer to display the contents (known as the **directory**) of the disk. The names you see on the screen are called files. In this case the files are the programs that make up MS-DOS. Other information on the screen is:

- The size of each file, measured in characters.
- The date the file was created or modified.
- The time the file was created or modified.

The usual MS-DOS screen display is 25 lines from top to bottom and 80 columns wide. (There is also a 40-column screen display available; see Appendix L for details.) Since there are more than 25 files on the MS-DOS System Disk, the filenames will *scroll*—that is, they will move up to the top of the screen and then disappear, making room for additional filenames, until all the filenames have appeared. You can cause the screen to display only 25 lines at a time by typing:

DIR /P

instead of just DIR.

Refer to the MS-DOS User's Guide and the MS-DOS Reference Guide for information on creating and working with files.

Volume in drive A is DOS 3-2
Directory of A:\

COMMAND	COM	23612	3-21-86	12:00p
ANSI	SYS	1651	3-21-86	12:00p
ATTRIB	EXE	8234	3-21-86	12:00p
BACKUP	EXE	22906	3-21-86	12:00p
CHKDSK	EXE	9680	3-21-86	12:00p
FC	EXE	14446	3-21-86	12:00p
DISKCOPY	EXE	3936	3-21-86	12:00p
DRIVER	SYS	1102	3-21-86	12:00p
EDLIN	EXE	7356	3-21-86	12:00p
FDISK	EXE	16444	3-21-86	12:00p
FIND	EXE	6403	3-21-86	12:00p
GRAFTABL	EXE	8210	3-21-86	12:00p
GRAPHICS	EXE	13170	3-21-86	12:00p
JOIN	EXE	8942	3-21-86	12:00p
KEYBDV	EXE	2850	3-21-86	12:00p
KEYBFR	EXE	2912	3-21-86	12:00p
KEYBGR	EXE	2904	3-21-86	12:00p
KEYBIT	EXE	2856	3-21-86	12:00p
KEYBSP	EXE	2947	3-21-86	12:00p
KEYBUK	EXE	2850	3-21-86	12:00p
LABEL	EXE	2750	3-21-86	12:00p
MODE	COM	5431	3-21-86	12:00p
RECOVER	EXE	4145	3-21-86	12:00p
REPLACE	EXE	4852	3-21-86	12:00p
RESTORE	EXE	21360	3-21-86	12:00p
SHARE	EXE	8544	3-21-86	12:00p
SUBST	EXE	9898	3-21-86	12:00p
TREE	EXE	8556	3-21-86	12:00p
RAMDRIVE	SYS	6454	3-21-86	12:00p
XCOPY	EXE	5396	3-21-86	12:00p
DISKCOMP	EXE	3808	3-21-86	12:00p
ASSIGN	COM	1523	3-21-86	12:00p
MORE	COM	282	3-21-86	12:00p
PRINT	EXE	8824	3-21-86	12:00p
SORT	EXE	1898	3-21-86	12:00p
FORMAT	EXE	10973	3-21-86	12:00p
SYS	COM	4607	3-21-86	12:00p

37 File(s) 17408 bytes free

FIGURE 3-5. MS-DOS DIRECTORY

SETTING THE MICROPROCESSOR CLOCK SPEED

The 8088-1 microprocessor in the PC10/PC20 is capable of running at three different clock (i.e., processing) speeds:

- **Standard speed**— 4.77 MHz
- **Turbo speed** — 7.16 MHz
- **Double speed** — 9.54 MHz

The PC10 is pre-set to the standard 4.77 MHz speed. You can switch between the two clock speeds by using either the MS-DOS SPEED command, or special key combinations on the keyboard while in MS-DOS.

To set the clock speed using the SPEED command, first make sure the MS-DOS prompt is showing on the screen. Then type the word SPEED, followed by a space, a dash, and then a letter (s, t or d) denoting the desired speed. For instance, if you are in standard speed and you want to change to turbo speed, type the following and press Enter:

SPEED -T

To set the clock speed from the keyboard, use these key sequences:

- CTRL-ALT-S for standard speed (4.77 MHz)
- CTRL-ALT-T for turbo speed (7.16 MHz)
- CTRL-ALT-D for double speed (9.54 MHz)

NOTE: Some software may require that you select standard speed (4.77 MHz) for normal operation.

AUTOCONFIG™




The PC10/PC20 is “autoconfiguring”; meaning that it recognizes when expansion cards are put into the machine, and adjusts system operations accordingly. For instance, if you insert a parallel or serial card in an expansion slot, AUTOCONFIG will automatically assign unique input and output addresses to ensure that the expansion cards don't interfere with the rest of the PC10/PC20.

See Appendix K for details on AUTOCONFIG operation.

VIDEO MODES AND HOW TO SET THEM

The display on your monitor screen is controlled by computer circuitry known as a video controller. Your Commodore PC10/PC20 contains a special factory-installed video controller chip that is compatible with many types of video monitors (monochrome or color, composite or RGB, etc.), thus allowing you to produce a variety of displays (text and/or graphics, monochrome or color, standard or high resolution, etc.). The specific type of display is usually determined by the software program that you are running.

You can switch back and forth between video modes by setting the dip switches marked CONFIG on the back of the System Unit, in accordance with the following table:

VIDEO MODE	SWITCH SETTING
Monochrome	
Color 80 columns	
Color 40 columns	

In the table, an up arrow indicates that the switch is set to OFF and a down arrow indicates that the switch is set to ON. **MAKE SURE THAT POWER IS OFF WHEN YOU SET THE SWITCHES.**

NOTE: The information in this table also appears on the back of the System Unit.

The video configuration switch settings are checked by the computer whenever the system is booted.

*** CAUTION ***

If you want to change the video mode, make sure you have attached the proper monitor for the mode you want to use. Turn off the power and set the switches to the proper position for the desired mode. Then reboot the system.

You are given 3 choices of default monitor settings you can use to run MS-DOS. Appendix L contains detailed information on all of the video modes and their characteristics. Add-on display adapters can give you more display features. Although you must start in one of the 3 modes described here, all of the modes described in Appendix L are available under program control. Software packages that require a different display mode will switch to that mode automatically.

REBOOTING MS-DOS

If for some reason you just want to start over again from the beginning, press the Ctrl, Alt and Del keys simultaneously. This restarts MS-DOS.

You can also reboot MS-DOS by pressing the **Reset** switch on the right side of the System Unit. (See Appendix E for more information on the Reset switch.)

*** CAUTION ***

Rebooting MS-DOS destroys whatever is in the computer's memory. You should therefore be very careful in using these rebooting procedures.

HOW TO QUIT MS-DOS

There is no Quit command in MS-DOS, but ending your MS-DOS session is easy. Follow these steps:

1. **MAKE SURE THAT YOUR LAST COMMAND HAS FINISHED PROCESSING.**

You should see the MS-DOS prompt (usually A>) on the screen.

2. **TAKE OUT ANY FLOPPY DISK(S) IN THE DRIVE(S).**

Make sure to put the disk(s) back in the protective jacket(s); store in a safe place.

3. **TURN OFF YOUR COMPUTER.**
4. **TURN OFF YOUR MONITOR.**

That's all there is to it.

HOW TO PREPARE DISKS FOR USE WITH MS-DOS

You must “format” all new disks before they can be used by MS-DOS. A disk is formatted with the MS-DOS **FORMAT** command.

NOTE: If the disk is not blank, the formatting process will destroy any data that exists on the disk. Therefore, before you format a disk you should be certain that the disk is blank, or that if the disk is not blank you don't want to save any of the information it contains.

USING THE FORMAT COMMAND

The syntax of the **FORMAT** command is:

```
FORMAT [d:] [/1] [/4] [/8] [/n:xx] [/t:yy] [/v] [/s]
```

where the information in brackets indicate **options** or **switches**. (See the description of the **FORMAT** command in Chapter 3 of the MS-DOS User's Reference manual for definitions of all the options.)

If you do not specify an option, the system will use the default value for the option. For example, the characters **d:** designate the drive that contains the disk to be formatted. If you do not specify a disk drive (for example, A: or B:), MS-DOS will format the disk in the default drive (usually this is Drive A:). This means that you can format a disk in the default drive (whether the default drive is A: or B:) just by typing the **FORMAT** command and pressing the Enter key, like this:

```
FORMAT
```

If you want to format a disk in a drive other than the default drive, you must type the **FORMAT** command followed by the drive designator. For instance, if the default drive is Drive A: and you want to format a disk in Drive B:, you type the following after the **A>** prompt:

```
FORMAT B:
```

SCREEN MESSAGES DISPLAYED DURING THE FORMATTING PROCESS

During the formatting process a number of messages appear on the screen. For example, suppose that Drive A: is the default drive and you want to format a disk in Drive B:. First make sure that the A> prompt is showing on the screen; then type:

FORMAT B: /V/S

and press the Enter key. The following message appears on the screen:

Insert new diskette for drive B:
and strike any key when ready

After you insert the new disk in drive B: and press any key on the keyboard, the system responds:

Formatting. . .

When the formatting is finished, a message like this appears:

Formatting. . . Format complete
System transferred

Volume label (11 characters. RETURN for none)?

Since you included the characters /V in the FORMAT command, MS-DOS is asking for the volume label of the disk. Volume labels are like a name tag for each disk. An example of a volume label is PROGRAMS. When you assign a unique volume label to a disk, you can always be sure that you know which disk you are using. The volume label assigned to a disk can be displayed by issuing the MS-DOS VOL command (refer to the **MS-DOS Commands** chapter in the MS-DOS User's Reference manual for more information on the VOL command).

NOTE: When you add the characters /S to the command, the system files needed to boot MS-DOS will be copied onto the new disk. This means that you will be able to boot MS-DOS from this disk, instead of having to use the MS-DOS System Disk. Of course, if you want to use any of the MS-DOS **external** commands, you will have to insert the System Disk in a floppy drive.

Type a volume label in response to the **Volume** prompt if you want to name this disk, and press Enter. If you do not want to attach a label to this disk, simply press the Enter key. You will then see on your screen a message similar to this:

362426 bytes total disk space
362426 bytes available on disk

Format another (Y/N)?-

Type Y and press Enter to format another disk. Type N and press Enter to end the FORMAT program.

HOW TO BACK UP YOUR DISKS

You should make a backup copy of your MS-DOS System Disk. In fact, it is strongly recommended that you make backup copies of all your disks. If a disk becomes damaged or if files are accidentally erased, you will still have all of the information on your backup disk.

You can back up disks by using the DISKCOPY command. This command copies the contents of a disk onto another disk. DISKCOPY is the fastest way of copying a disk because it copies the entire disk in one operation, including MS-DOS system files if they exist.

The format of the DISKCOPY command is:

DISKCOPY [drive 1:] [drive2:]

Drive 1: is the disk drive that contains the disk that you want to copy (also known as the **source** disk). Drive 2: is the disk drive that contains the blank disk (also known as the **target** or **destination** disk).

For example, if you want to make a copy of your MS-DOS System Disk, type in the following command and press the Enter key:

DISKCOPY A: B:

MS-DOS responds:

Insert source diskette into drive A:
Insert target diskette into drive B:
Press any key when ready

Make sure the MS-DOS disk is in drive A: and insert a blank disk in drive B: Press any character key after you have done this and MS-DOS will begin copying the MS-DOS disk. After MS-DOS has copied the disk, the screen displays this message:

Copy complete

Copy another (Y/N)?

You now have a duplicate copy of the MS-DOS System Disk.

Type Y (for Yes) and press Enter if you want to copy another disk with DISKCOPY. MS-DOS will then repeat the procedure just described. If you don't want to copy another disk, just type N (for No), and MS-DOS will display the default drive prompt.

Disks must be the same size and density to be copied with the DISKCOPY command. Refer to the **MS-DOS Commands** chapter in the MS-DOS User's Reference manual for more information on the DISKCOPY command.

NOTE: If either of the disks that you are using has defective tracks, DISKCOPY will not work. Use the COPY command to back up your disks in these cases. (COPY will skip over defective tracks.) Refer to the **MS-DOS Commands** chapter in the MS-DOS User's Reference manual for information on how to use COPY to back up your disks.

LOADING AND RUNNING APPLICATION SOFTWARE

To load application software, first read the instructions in the program manual, especially any instructions concerning the video mode. Make sure that MS-DOS is loaded. Then insert the application software disk in Drive A: (the floppy disk drive) and type the name of the software program after the MS-DOS prompt. Then press the Enter key. The red light on Drive A: will come on and the program will load. Once the program is loaded, follow the operating instructions supplied with the program.

THE COMMODORE PC10/PC20 WITH A HARD DISK

The Commodore PC20 includes an internal 3½ inch hard disk drive capable of storing 20 megabytes (approximately 20 million characters) of information. A hard disk can also be installed as an option on the PC10. (See your dealer for information on hard disk types available for the PC10.)

Because of its large storage capacity, a hard disk essentially eliminates the need to continually insert and remove individual floppy disks, which contain at most only 360 kilobytes (approximately 360,000 characters) of information. (Note: A hard disk is also referred to as a fixed disk).

INSTALLING MS-DOS ON A HARD DISK

If you have a PC20, the hard disk has already been formatted and partitioned and MS-DOS is installed on it.

If you install a hard disk as an option on the PC10, you (or your dealer) must format and partition the hard disk and then install MS-DOS on it. See Appendix M for information on formatting and partitioning a hard disk on a PC10. Also see your hard disk user's manual, and Appendix F of the MS-DOS User's Reference manual.

BOOTING MS-DOS FROM A HARD DISK

Here's a step by step procedure to follow in booting MS-DOS from a hard disk. It is assumed that all your equipment has been correctly installed but is not turned on.

1. **TURN ON THE MONITOR.**

Press the power switch on the monitor. For most monitors, a power indicator light on the front of the monitor glows when the power is turned on.

2. **MAKE SURE THERE IS NO FLOPPY DISK IN DRIVE A:.**

If there is a floppy disk in Drive A:, the computer will try to access this rather than accessing the hard disk.

3. **TURN ON THE SYSTEM UNIT.**

Press the power switch on the rear of the System Unit. (See Figure 2-2.) After a short time the computer accesses the hard disk and the green hard disk activity light on the front of the System Unit comes on, indicating that the disk is being read. In a few seconds the "booting" or loading of MS-DOS is completed, and the opening MS-DOS display appears on the monitor screen.

Once the opening screen appears, you can either respond to the MS-DOS date and time prompts, or you can use SETCLOCK -R to read the time from the hardware clock/calendar to MS-DOS. When the MS-DOS prompt appears (the prompt is C> for the hard disk) you are ready to start computing — either by using MS-DOS commands, or by loading and running a programming language, an application program, etc.

COPYING APPLICATION SOFTWARE TO THE HARD DISK

If the floppy disk for an application software is not protected, you can use the COPY command to copy the software to a hard disk (if your system has one). You will then not need to insert the program's floppy disk in Drive A: to load the program. Just load the program from the hard disk.

Note: Check the documentation included with your software program. Many programs include special procedures for easy transfer of the software to hard disk.

MS-DOS DIRECTORIES AND THE HARD DISK

The hard disk can hold a great amount of information in individual files. These files can be arranged in *multilevel* or *hierarchical* file structures. You can identify and organize these files for quick and easy access by using the MKDIR command. *If you are using a hard disk, be sure to read the information on directories and the MKDIR command in Chapters 1, 2 and 3 of the MS-DOS User's Reference manual.*

HOW TO CONFIGURE YOUR SYSTEM

WHAT IS A CONFIGURATION FILE?

In some cases there is installation-specific information needed by MS-DOS at system startup. An example of this is a standard device driver, such as external floppy disk drives. In MS-DOS, you specify these settings in a *configuration file*.

The MS-DOS configuration file, named CONFIG.SYS, is simply a file that has certain commands for MS-DOS to use at startup. The CONFIG.SYS file allows you to configure your system with a minimum of effort. For example, you can add device drivers to your system at startup by using a simple command in the CONFIG.SYS file. Each time you start MS-DOS, MS-DOS searches the directory of the startup drive (drive A: for a PC10, or drive C: for a PC20) for a file named CONFIG.SYS.

CREATING OR CHANGING THE CONFIG.SYS FILE

You can use the MS-DOS editor, EDLIN, to create or change a CONFIG.SYS file; you can then save it on the MS-DOS disk in your root directory. (See Chapter 6 of the MS-DOS User's Reference Manual for a full description of EDLIN.)

CONFIG.SYS COMMANDS

The commands used in the CONFIG.SYS file are described in detail in Appendix B of the MS-DOS User's Reference Manual. For a sample CONFIG.SYS file, see the example at the end of that appendix.

CUSTOMIZING THE MS-DOS STARTUP SEQUENCE WITH AN AUTOEXEC.BAT FILE

An AUTOEXEC.BAT file is an MS-DOS file that lets you run programs automatically when you start MS-DOS. This can be useful when you want to run specific application under MS-DOS. By using an AUTOEXEC.BAT file you can avoid loading two separate disks to run the program. You can also use an AUTOEXEC.BAT file to execute a batch program each time you start your computer. (Batch programs consist of a file that contains a number of commands in a specific sequence; this command sequence is executed automatically whenever you load that file.)

When you start your computer, MS-DOS searches the directory of the default disk drive for a file named AUTOEXEC.BAT. If the file is found, MS-DOS immediately processes it, bypassing the date and time prompts. If MS-DOS does not find an AUTOEXEC.BAT file, then the date and time prompts appear automatically.

HOW TO CREATE AN AUTOEXEC.BAT FILE

There are many things you can do with an AUTOEXEC.BAT file to help you use MS-DOS more efficiently. For instance, you can customize the MS-DOS prompt and automatically call up any options you plan to use on a regular basis. The following procedure will allow you to create a typical AUTOEXEC.BAT file:

1. Type the following command and then press Enter:

```
COPY CON: AUTOEXEC.BAT
```

This command tells MS-DOS to copy what you type from the keyboard into the AUTOEXEC.BAT file. Note that you must put the AUTOEXEC.BAT file in the root directory of your MS-DOS disk. (See the MS-DOS User's Reference manual for information on the use and structure of MS-DOS directories and associated commands.)

2. Now type the following lines:

```
PATH = C:\;C:\SYSTEM;A:\
PROMPT $P
SETCLOCK -R
SPEED -D
```

In the PATH line, the designation C: refers to a hard disk. (This example is only applicable if you have a hard disk installed.) The word **SYSTEM** is the name of a directory into which you have placed all the files from the two floppy disks that you received with your computer.

3. After the last line, press CTRL-Z and press Enter to copy these lines into the AUTOEXEC.BAT file.

Once your AUTOEXEC.BAT file is set up as above, it will perform the following actions when you start MS-DOS:

- Set your command search path.
- Set your prompt to display the default drive and directory.
- Read the date and time from the hardware clock/calendar and send it to MS-DOS.
- Set the microprocessor to run at double speed (9.54 MHz) instead of the normal standard speed (4.77 MHz).

You can put any MS-DOS command or series of commands in the AUTOEXEC.BAT file. See Chapter 4 in the MS-DOS User's Reference manual for detailed information on creating and using an AUTOEXEC.BAT file.

CUSTOMIZING THE COMMODORE PC FOR YOUR COUNTRY

There are several commands and options that allow you to customize your Commodore PC for use in your country.

1. The COUNTRY command (described in Appendix B of the MS-DOS User's Reference manual) can be added to the CONFIG.SYS file. The command sets the time, date, currency and case conventions for the selected country.
2. The KEYBXX command (described in Appendix J of this book and in Chapter 3 of the MS-DOS User's Reference manual) can be added to the AUTOEXEC.BAT file. This command then automatically selects the keyboard configuration for the system.
3. Some Commodore PC models include a special character set ROM (read-only memory) that supports the Scandinavian character set as well as the USA/European character set. If you want to use the Scandinavian character set, see Appendix E of this manual for instructions on how to set the character set dip switch.

SUGGESTED READING

You have now completed the main text of the Commodore PC10/PC20 Operations Guide. The appendices that follow provide additional information about MS-DOS and technical aspects of the PC10/PC20.

For best results in using your PC10/PC20 on a regular basis, you should also refer to the documentation for any equipment and software you plan to use with your PC10/PC20, as well as the MS-DOS documentation included in the PC10/PC20 package.

The above documentation should provide the information you need to load and run typical application programs. Be sure to follow the instructions supplied with whatever software package you are using.

If you plan to create your own programs, you will want to read carefully the MS-DOS documentation, especially the MS-DOS Reference manual. If you plan to use the BASIC programming language, read the GW-BASIC Interpreter User's Guide and GW-BASIC Interpreter User's Reference manual.

Appendix A

List of Filename Extensions

Extension	Type	Example
COM	Required for a transient executable file.	DISKCOPY.COM EDLIN.COM
ASM	Required for assembly language source (text) files used with ASM command.	PROG1.ASM PATCH.ASM
LST	Required for the listing file of the assembly language program.	PROG1.LST PATCH.LST
OBJ	Identifies relocatable object file created by assembler.	TEST.OBJ
BAS	Required for BASIC program source (text) files.	PROG1.BAS
INT	Required for program intermediate file for execution (already compiled).	PROG1.INT
BAK	Created by EDLIN (text editor) as a backup copy of file before it is altered.	FILE1.BAK
\$\$\$	Temporary (scratch) files created and normally erased by EDLIN and other programs.	FILE1. \$\$\$

BAT	Text file with commands or names of programs to be executed batch style by the Batch facility.	JOB1.BAT
EXE	Relocatable executable file.	SORT.EXE
SYS	System file or utility.	IO.SYS

Appendix B

List of Logical Device Identifiers

AUX:	Refers to input from or output to an auxiliary device. This could be another computer if you have two machines connected together for transferring files.
CON:	For 'console' or terminal, including keyboard and display (Input/Output). If using as an input device (keyboard), there is a key-combination to indicate 'end of input' (see Appendix C).
PRN:	This 'listing' or 'print' device such as a printer.
NUL:	Does not refer to any particular file or device. NUL is used when the syntax of a command requires that a filename is specified even though the file is not to be used. It is useful for testing applications: as an input device it simulates end-of-file immediately; as an output device it simulates successful writing of data without data actually being written.
COM1	Serial port
COM2	Serial port
LPT1	Parallel printer port
LPT2	Parallel printer port
LPT3	Parallel printer port

Appendix C

Special Key Sequences

Editing Keys

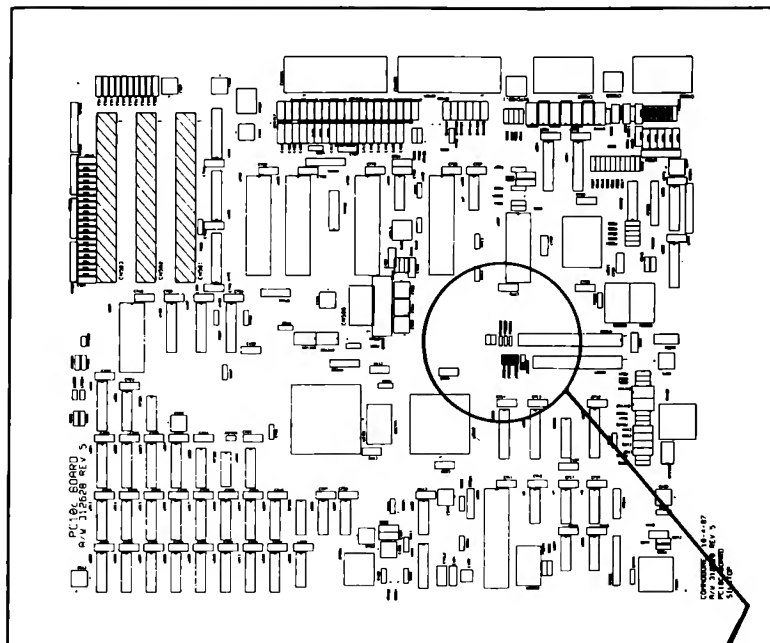
Key	Description of function
F1	Copy one character from template (last line entered) to new command line.
F2	Copy characters up to a specified character from template to new command line.
F3	Copy remainder of template to new command line.
DEL	Do not copy next character from template to new command line.
F4	Do not copy characters from template to new command line up to a specified character.
ESC	Cancel new command line.
INS	Switch character insertion on.
INS	Switch character insertion off.
F6	Accept new command line as template for further editing.

Other Keys

Key	Description of function
Ctrl-C or Ctrl-Break	Abort current command.
Ctrl-J or Ctrl-␣	Terminates an input line without sending it to MS-DOS. Used to extend input line beyond one line.
Ctrl-P or Ctrl-PrtSc	Switches echoing of console output to printer on.
Ctrl-N or Ctrl-PrtSc	Switches echoing of console output to printer off.
Ctrl-S or Ctrl-NumLock	Suspends screen listing. Output remains suspended until any key is depressed.
Ctrl-X or ESC	Cancel current command-line.
Ctrl-Z or F6 then ␣	Terminates input in edit or in COPY from CON.
Ctrl-H or Backspace	Move cursor back and delete.
PrtSc	Print current screen contents.
Ctrl-Alt-Del	Re-boot MS-DOS.
Ctrl-Alt-S	Set microprocessor clock speed to 4.77 MHz (standard speed)
Ctrl-Alt-T	Set microprocessor clock speed to 7.16 MHz (turbo speed)
Ctrl-Alt-D	Set microprocessor clock speed to 9.54 MHz (double speed)

Appendix D

Jumper Settings on Motherboard



JMP 208 **A position = No XT-type Hard Disk installed (PC10 as Shipped)—Use this position if a standard hard card or a hard disk/controller is installed in an expansion slot.**
 B position = XT-type Hard Disk installed (PC20 as Shipped; PC10 w/optional XT-type Hard Disk)

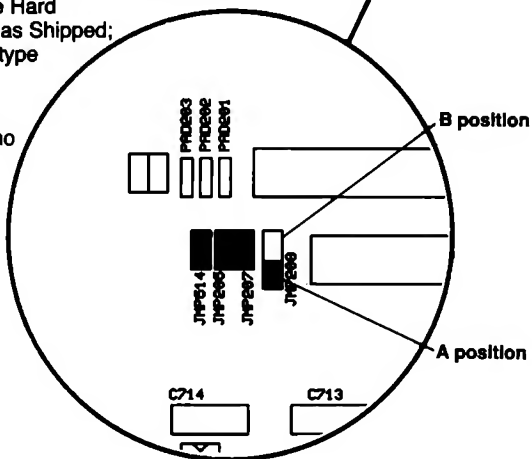
JMP 614 In—Composite Color
Out—Composite Mono

**All other jumpers
are for factory
use only**

```

JMP 206 In
      207 In

```



Appendix E

Dip Switch Settings and the Reset Switch

DIP SWITCH SETTINGS





These switch settings refer to the CONFIG switch area on the back of the system unit.

SWITCH #1

UP(OFF) USA/Europe Character Set
DOWN(ON) Scandinavian Character Set

SWITCH #2

UP(OFF) Onboard Video Adapter is MONO
DOWN(ON) Onboard Video Adapter is COLOR

SWITCH #3	SWITCH #4	DEFAULT VIDEO MODE	SAMPLE SETTING
UP(OFF)	UP(OFF)	Monochrome	
UP(OFF)	DOWN(ON)	80 Column Color	
DOWN(ON)	UP(OFF)	40 Column Color	
DOWN(ON)	DOWN(ON)	NO MONITOR	

THE RESET SWITCH

The Reset switch protrudes slightly on the right side of the machine just behind the keyboard connector. Pressing this switch will effectively re-boot the computer as if the power had been cycled OFF and then ON. All information in the computer's RAM memory, as well as information being written to mass storage devices such as hard disks or floppy disks while the switch was depressed may also be lost.

The intent of the switch is to provide an alternative to cycling power when an application program may have "crashed" the computer.

Appendix F

Pin Definitions for Parallel Port

Computer Side	Printer Side
1	STROBE
2	DO
3	D1
4	D2
5	D3
6	D4
7	D5
8	D6
9	D7
10	ACK
11	BUSY
12	PE
13	SLCT
14	AUTO FDXT
15	ERROR
16	INIT
17	SLCT IN
18-25	GND

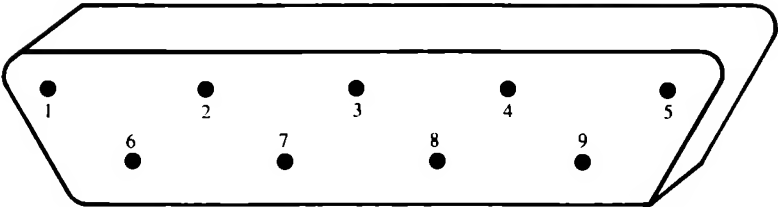
Appendix G

Pin Definitions for Serial Port

Computer Side	Peripheral Side
1	CHASSIS GND
2	T × D
3	R × D
4	RTS
5	CTS
6	DSR
7	SIG GND
8	DCD
9	+ 12 V
10	- 12 V
20	DTR
22	RI

Appendix H

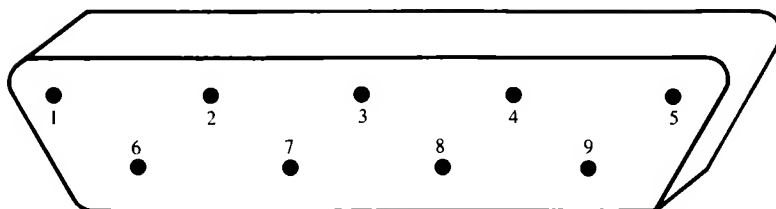
Pin Definitions for Mouse Port



Pin No.	Signal
1	Vertical
2	Horizontal
3	Vertical Q
4	Horizontal Q
5	Button (3)
6	Button (1)
7	+ 5 volts
8	Ground
9	Button (2)

Appendix I

Pin Definitions for RGBI Video Port



Video Connector

DB9 Female Connector

Color/Graphic Modes		Monochrome Mode	
Pin No.	Signal	Pin No.	Signal
1	GND	1	GND
2	GND	2	GND
3	RED	3	not used
4	GREEN	4	not used
5	BLUE	5	not used
6	INTENSITY	6	INTENSITY
7	MONO	7	VIDEO
8	H SYNC	8	H SYNC
9	V SYNC	9	V SYNC

Appendix J

The Commodore PC10/PC20 Keyboard

The Commodore PC10/PC20 Keyboard is divided into four sections:

- the Typewriter Area
- the Special Key / Cursor Key area
- the Numeric Keypad
- the Function Keys

In using the Commodore PC10/PC20 keyboard, note that:

- All the keys on the keyboard repeat as long as they are held down.
- You cannot interchange either the numeral zero (0) and the upper case letter o, or the numeral 1 and the lower case letter l.
- Keys may be **program controlled**. this means that their use is defined by the programming language or application software currently being used. The description of the specific function of these keys can be found in the MS-DOS Reference Manual or in the manual for the particular applications software being used.

In this appendix, whenever combinations of keys are to be pressed, the names of the keys to be pressed are separated by a hyphen. For example, *Ctrl-Alt-Del* means hold the Ctrl and Alt keys down and then press the Del key at the same time. See Appendix C for a list of special key sequences used in Ms-DOS.

An illustration of the keyboard is shown in Figure J-1.

The following pages describe each area of the keyboard, including definitions of the individual keys in each area. To make full use of your PC10/PC20 computer, you should become familiar with the names, locations and functions of all the keys .

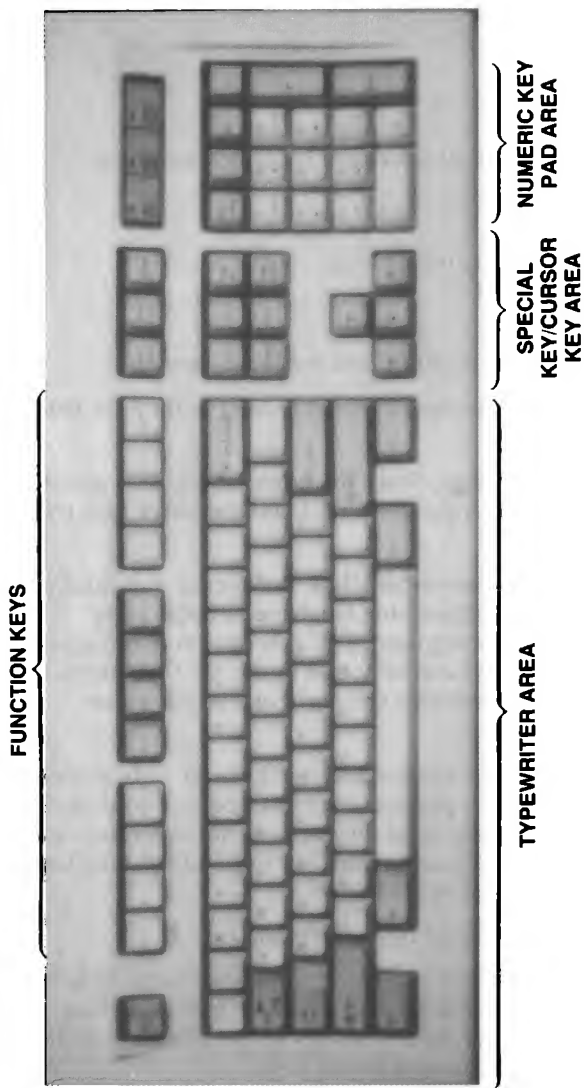


FIGURE J-1. THE COMMODORE PC10/PC20 KEYBOARD

THE TYPEWRITER AREA

The Typewriter Area contains a standard typing keyboard and some additional keys.

The SHIFT keys

There are two Shift keys in the Typewriter Area. They are oversize keys with an upward pointing arrow, and are located at each end of the second from the bottom row of typing keys.

Holding down either shift key and pressing any of the alphabetic keys causes the letter shown on that key to be displayed in upper case. In addition, the shift keys are often used with other keys to perform special functions.

If the Caps Lock or Num Lock key is on, pressing the SHIFT key cancels the effect of that key. For example, if Caps Lock is on and you hold down the SHIFT key and press the A key, then the lower case letter (i.e., a) is displayed.

The CAPS LOCK key

Pressing the Caps Lock key at the left side of the middle row of typing keys locks the characters A through Z into the upper case position. When you first press the Caps Lock key, an indicator light located above the Numeric Keypad goes on. To release the Caps Lock Key, you press the key again and this light goes out.

Lower case characters can be obtained while the Caps Lock light is on by holding down the SHIFT key and pressing the required letter key.

The BACK SPACE key

This key is located on the far right side of the top row of the main keyboard, and has a small horizontal arrow pointing left. Pressing the Back Space key causes the character to the LEFT of the cursor to be erased, while the cursor and any characters to the RIGHT of the cursor move one position to the left.

The ENTER key

There are two Enter keys: one on the main keyboard, and one in the Numeric Keypad. The Enter key on the main keyboard is located at the right side of the middle row. On the top of this key is a right-angled arrow that points left. You must press the Enter key to transmit a command or information to the computer. The Enter key (which can be program controlled) may be referred to as a Return key or as a CR (Carriage Return) key in some program documentation.

The ALT key

There are two Alt (for "Alternate") keys, located at either end of the Space Bar in the bottom row of typing keys. The Alt key has several uses:

- Pressing the alt key simultaneously with the Ctrl and Del keys restarts (or "reboots") MS-DOS.
- Holding down the alt key and pressing a single alphabetic key A through Z allows you to enter a GW-BASIC keyword automatically. This is fully described in the GW-BASIC manual.
- Special characters can be entered using the Alt key and the number keys on the numeric keypad to the right of the main keyboard. Hold down the Alt key, type the three digit ASCII code for the required character and then release the Alt key. The character is then displayed. a list of ASCII character codes is shown in Appendix C of the GW-BASIC User's Guide.

The CTRL key

There are two Ctrl (for "Control") keys, located at either end of the bottom row of typing keys. The Ctrl key is a program controlled key. It is also used in conjunction with other keys to perform various control functions for MS-DOS. See Appendix C, Special Key Sequences.

The ESC key

The Esc (for "Escape") key, located at the far left of the top row of the keyboard, is a program controlled key.

The TAB key

This is the key with small horizontal arrows pointing left and right. The Tab key is located at the far left of the second row from the top row of the typing keys. This key is used to set and remove tabs.

The SPACE Bar

This is the large key extending most of the way across the bottom of the main keyboard. This key is similar in location and function to the space bar on a typewriter. The Space Bar moves the cursor to the right, inserting spaces as it moves. If there are any characters in the path of the cursor movement, they are erased.

THE SPECIAL KEY/CURSOR KEY AREA

This area contains 13 keys, including a four key cursor keypad at the bottom and some special keys. Certain keys have multiple functions (e.g., Pause/Break). These functions are printed on the top and front of the keys. You press the Shift key to activate the function on the front of the key.

The PRINT SCREEN key

The Print Screen key is used to give a printed copy of the information displayed on the screen. Alpha/numeric characters displayed on the screen, such as program listings, can be printed on daisy wheel, dot-matrix and laser printers. Graphics information can usually only be reproduced on dot-matrix or laser printers.

The SYS REQ key

The Sys Req (for "System Request") is the shifted Prt Scr key. This is a program controlled key.

The SCROLL LOCK key

This is a program controlled key. It is used typically to halt the scrolling of information on the screen. Usually, to resume scrolling, you press the key again.

The PAUSE key

This is a program controlled key. It is used typically to temporarily halt program execution.

The BREAK key

The Break key is the shifted Pause key. This is a program controlled key. The Break key is used in conjunction with the Ctrl key in a Ctrl-Break sequence (actually a Ctrl-Shift-Pause sequence) to stop a GW-BASIC program when it is running. Under MS-DOS, Ctrl-Break has the same function as Ctrl-C: that is, it aborts the command currently being executed.

The INSERT key

Pressing the Insert key turns the insert function on. Any characters typed while the Insert function is on are inserted at the cursor position, without overwriting (i.e., deleting) any character already at the cursor position. To turn the Insert function off, press the Insert key again. Any character typed when Insert is off appears at the cursor position and overwrites any character already at the cursor position.

The DELETE key

Pressing the Delete key deletes the character at the cursor position. The cursor remains at that position and all the characters to the right of it move one position to the left.

The HOME key

This key moves the cursor to the top left corner of the screen, which is known as the Home position.

The END key

This key places the cursor one character position to the right of the last character on the line.

The PAGE UP key

The Page Up key is a program controlled key that moves the cursor to the next page (a full page is 24 lines) in the program.

The PAGE DOWN key

The Page Down key is a program controlled key that moves the cursor to the previous page in the program.

Controlling the Cursor from the Cursor Keypad

You can move the cursor around the screen by using the four cursor keys located in the Cursor Keypad located at the bottom of the keyboard, between the Typewriter Area and the Numeric Keypad. Cursor movement is controlled as follows:

- the up arrow key moves the cursor up
- the down arrow key moves the cursor down
- the right arrow key moves the cursor to the right
- the left arrow key moves the cursor to the left

The cursor moves one line or one character position for each time a key is pressed. The cursor will move continuously as long as you are holding down a key.

THE NUMERIC KEYPAD

The Numeric Keypad is at the far right of the Commodore PC10/PC20 keyboard. The keys in this section of the keyboard usually function as number and mathematical keys as long as the Num Lock Key is on. With the Num Lock Key off, you can use certain keys to control the position of the cursor on the screen and perform some special functions. Note that many of the functions of keys in the Special Key/Cursor Key area are available in the Numeric Keypad.

Controlling the Cursor from the Numeric Keypad

You can control cursor movement from the Numeric Keypad by using the 2, 4, 6 and 8 keys, as follows:

- the 8 key moves the cursor up
- the 2 key moves the cursor down one
- the 6 key moves the cursor to the right
- the 4 key moves the cursor to the left

The cursor moves one line or one character position for each time a key is pressed. The cursor will move continuously as long as you are holding down a key.

The NUM LOCK key

Pressing the Num Lock key locks the numeric keys 0 through 9 into the numeric position. When you first press this key, an indicator light located above the Numeric Keypad goes on. To release this key, press the key again and this light goes out.

The other functions on the Numeric Keypad keys (such as scrolling the cursor by using the 2, 4, 6 and 8 keys) can be obtained while the Num Lock is on by holding down the Shift key and pressing the required key.

The HOME key

This key (the 7 key) moves the cursor to the top left corner of the screen, which is known as the Home position.

The END key

This key (the 1 key) places the cursor one character position to the right of the last character on the line.

The INS key

Pressing the Ins (for "Insert") key (the 0 key) turns the Insert function on. Any characters typed while the Insert function is on are inserted at the cursor position. To turn the Insert function off, press the Ins key again. Any characters typed when Insert is off appear at the cursor position, overwriting (i.e., deleting) any character already at the cursor position.

The DEL key

Pressing the Del (for "Delete") key (the decimal point key) deletes the character at the cursor position. The cursor remains at that position and all the characters to the right of it move one position to the left.

The PG UP key

The Pg Up (for "Page Up") key (the 9 key) is a program controlled key that moves the cursor to the previous page (a full page is 24 lines).

The PG DN key

The Pg Dn (for "Page Down") key (the 3 key) is a program controlled key that moves the cursor to the next page.

The +, -, * and / keys

These keys are used for mathematical functions: + for addition, - for subtraction, * for multiplication and / for division.

The ENTER key

You can press the Enter key to transmit a command or information to the computer. In other words, pressing this key has the same effect as pressing the Enter on the main keyboard. This can be a program controlled key.

THE FUNCTION KEYS

The Function Keys are the keys located in the horizontal row of keys above the Typing Area, and marked F1 through F12. These keys are program controlled keys — that is, their use is controlled by whatever software you are currently using.

SPECIAL KEYBOARDS

The PC10/PC20 MS-DOS software allows you to select any of a number of keyboard configurations by using the KEYBxx command. The keyboard configurations available may vary from country to country.

To select an alternate keyboard configuration, just type the appropriate KEYB xx command at the MS-DOS prompt and press ENTER.

In the KEYB xx command, the “xx” characters are the codes for various types of keyboards, such as those listed in the following table:

Code	Keyboard	Command
DV	Dvorak	keyb dv
FR	France	keyb fr
GR	Germany	keyb gr
IT	Italy	keyb it
SP	Spain	keyb sp
UK	United Kingdom	keyb uk

Check your MS-DOS System Disk to determine what keyboard configurations are available to you.

You should load only one keyboard program after starting MS-DOS. You can switch from the KEYB xx program keyboard to the default keyboard format (e.g., U.S./ASCII) at any time by pressing CTRL-ALT-F1. You can then return to the memory-resident keyboard program by pressing CTRL-ALT-F2.

For More Information About the Keyboard...

For more information about using the PC10/PC20 keyboard, see Chapter 1 of the MS-DOS User's Guide and the user's manuals for your software programs

Appendix K

AUTOCONFIG™

AUTOCONFIGuration is a unique feature of Commodore PC10/PC20 Personal Computers, allowing them to automatically sense additional peripheral devices plugged into the PC10/PC20 expansion bus. Once these additional devices are detected, the resident peripherals on the PC10/PC20 mother board are adjusted as not to interfere or “clash” with expansion peripherals. The AUTOCONFIG™ feature can prevent hardware damage to peripherals and motherboard, as well as ease the installation of expansion cards.

The AUTOCONFIG™ process is as follows:

Video

If onboard Video controller is configured as a MONO adapter (dip switch #2 is UP(OFF)), then an attempt is made to configure a MONO adapter in the expansion bus. If this is successful, then an expansion MONO adapter is assumed to be present and the onboard Video controller is never enabled.

If onboard Video controller is configured as a COLOR adapter (dip switch #2 is DOWN(ON)), then an attempt is made to configure a COLOR adapter in the expansion bus. If this is successful, then an expansion COLOR adapter is assumed to be present and the onboard Video controller is never enabled.

Put simply, if video adapter present on the expansion bus is the same as the onboard video controller is configured to be, then the onboard video controller will NOT be enabled!

It is possible however, to have two different video controllers in the system. For example, the onboard controller may be configured as a COLOR controller and a Monochrome Display Adapter (MDA) can be placed on the expansion bus because the devices do not respond to the same I/O or Memory addresses.

NOTE ON USE OF EGA MONITORS:

If you add an EGA adapter/monitor to your PC10/PC20, make sure that DIP switch 2 on the back of the System Unit is set for monochrome, as detailed in Appendix E (page 53). This will eliminate the possibility of memory address conflict between the EGA card and the on-board display circuitry.

Serial Port (COMn:)

Before the onboard serial port is enabled a scan of the two standard COMn: hardware locations is made. If serial hardware (serial card/modem) is found operational, possible bootup message(s) are:

“EXPANSION COM at 03F8h”

and/or

“EXPANSION COM at 02F8h”

If both available COM: addresses are occupied by expansion boards, then the onboard serial port will not be enabled. The onboard serial port will be configured and tested at I/O address 03F8h if no expansion COM:s are found and will be configured and tested to the unused COM: address if only one expansion COM: is found.

If the onboard serial port is configured and tested successfully a message will be output during bootup:

“ONBOARD COM at 03F8h”

or

“ONBOARD COM at 02F8h”

Parallel Port (LPTn: or PRN:)

Before the onboard parallel port is enabled a scan of the three standard LPTn: hardware locations is made. If parallel hardware (printer card) is found operational, possible bootup message(s) may be:

“EXPANSION LPT at 0378h”

and/or

“EXPANSION LPT at 0278h”

and/or

“EXPANSION LPT at 03BCh”

If all available LPT: addresses are occupied by expansion boards, then the onboard parallel port will not be enabled. The onboard parallel port will be configured and tested at I/O address 0378h if no expansion LPT:'s are found, and will be configured and tested to the unused LPT: address if two expansion LPT:'s are found. If only one expansion LPT: is found, the onboard parallel port will be enabled to the first available I/O address, when searching in the following sequence:

0378h,0278h,03BCh

If the onboard parallel port is configured and tested successfully, a message will be output during bootup:

"ONBOARD LPT at 0378h"

or

"ONBOARD LPT at 0278h"

or

"ONBOARD LPT at 03BCh"

Real-Time Clock

Before the onboard real-time clock hardware is enabled, a check is made for interfering hardware in the I/O address range 02C0h through 02CFh. If no interference is detected the onboard real-time clock is enabled.

A message will be output during bootup:

"ONBOARD RTC at 02C0h"

Mouse Port

A check is made for a standard Microsoft Bus Mouse.

If it is found in the I/O channel then the onboard Microsoft compatible mouse hardware is never enabled. The following message will appear during bootup:

"EXPANSION MOUSE at 023Ch"

If no expansion mouse is found the onboard mouse is enabled and tested. If the mouse is operational then the following message will appear during bootup:

“ONBOARD MOUSE at 023Ch”

NOTE: The onboard mouse hardware is enabled/tested independent of the presence of the actual mouse. The bootup messages will appear even if the Commodore PC Mouse Kit is not attached.

8087 Numeric Coprocessor

A test is made for the presence of an 8087 Numeric Coprocessor during bootup. If an 8087 is detected the following message will be output:

“8087 Numeric Coprocessor”

NOTE: Ensure that the 8087 coprocessor installed is 8MHz for turbo mode.

NOTES FOR THE PROGRAMMER

It is possible to override the configuration done at bootup. It is **STRONGLY RECOMMENDED** that only advanced programmers with experience with low-level hardware/software interaction attempt this.

NOTE: If software override of the default configuration is performed, the presence of any expansion hardware should be taken into account to prevent hardware clash resulting in damage of the expansion hardware or the PC10/PC20 motherboard.

Configuration is performed via the COMMODORE CONFIGURATION REGISTER at I/O address 230h. This register is read/write with only bit7 changing its meaning from read to write.

COMMODORE CONFIGURATION REGISTER—I/O addr 230h

R/W	bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
R	mono	rtc	X	mouse	com1	com0	lpt1	lpt0
W	venb'	rtc	X	mouse	com1	com0	lpt1	lpt0

mono — indicates that the onboard video adapter is setup as a monochrome adapter when high, color when low.

venb' — when set low the onboard video adapter will be enabled.

rtc — when set high the onboard real-time clock will be enabled.

X — this bit is reserved for future use.

mouse — when set high the onboard mouse will be enabled.

com1 com0

low low — onboard serial port is disabled.

low high — serial port enabled at I/O addr 2f8h

high low — serial port enabled at I/O addr 3f8h

high high — this configuration is reserved.

lpt1 lpt0

low low — onboard parallel port is disabled.

low high — parallel port enabled at I/O addr 3bch

high low — parallel port enabled at I/O addr 378h

high high — parallel port enabled at I/O addr 278h

IRQ Vectors Used in the PC10/PC20

0 — System Timer (Built-in)

1 — Keyboard (Built-in)

2 — Mouse Port (Built-in or Expansion)

3 — COM2: (Built-in or Expansion)

4 — COM1: (Built-in or Expansion)

5 — Hard Disk Controller (Built-in or Expansion)

6 — Floppy Disk Controller (Built-in)

7 — LPT1:, LPT2:, LPT3: (All ports; Built-in and Expansion)

Appendix L

PC10/PC20 Video Modes

NOTE: See Appendix E for information on setting the configuration dip switches to select video modes.

Video Mode Characteristics

Adapter Name	Resolution	Colors
CGA	80 column alpha (8 × 8 cell) 40 column alpha (8 × 8 cell) 320x200 graphics 640x200 graphics	16 of 16 colors 16 of 16 colors 4 colors black & white
Monitor type:	9Pin Video—RGBI (CGA or MultiSync Monitor) Composite Connector—NTSC color (40 columns) Composite Connector—NTSC mono (80 columns)	
Vert. Update:	60 hz	
Horz. Update:	15.7 Khz	
Max. Dot Clock:	14.318 Mhz	
PLANTRONICS	320x200 graphics 640x200 graphics	16 of 16 colors 4 of 16 colors
Monitor type:	same as CGA	
Vert. Update:	same as CGA	
Horz. Update:	same as CGA	
Max. Dot Clock:	14.318 Mhz	
MDA	80 column alpha (9 × 14 cell)	monochrome
Monitor type:	9Pin Video/TTL Monochrome Composite Connector—monochrome PAL monitor	
Vert. Update:	50 hz	
Horz. Update:	18.432 Khz	
Max. Dot Clock:	16.257 Mhz	

HERCULES	720 × 348 graphics	monochrome
Monitor type:	same as MDA	
Vert. Update:	same as MDA	
Horz. Update:	same as MDA	
Max. Dot Clock:	16.257 Mhz	

VIDEO SPECIFICS FOR THE PROGRAMMER

IBM CGA and MDA Modes

The standard IBM compatible Video modes are:

Color Graphics Adapter(CGA):

40 × 25 color alpha
80 × 25 color alpha
320 × 200 color graphics
640 × 200 b&w graphics

Monochrome Display Adapter(MDA):

80 × 25 mono alpha

Specific details concerning hardware registers and memory organization for the IBM compatible adapters are available in the PC Technical Reference as well as adapter specific Technical Reference guides which can be obtained from IBM. Because this information is readily available from many sources, this appendix focuses on the information which is less readily obtained.

Hercules Graphics Mode

This mode is essentially a bitmapped version of the MDA. The video dot clock (16.257 Mhz) and the screen resolution (720 × 348 pels) are identical. The memory requirement to hold one full display is just less than 32Kbytes; therefore, two display pages are available.

Page0: address b000:0000h to b000:7fffh

Page1: address b000:8000h to b000:ffffh

NOTE: Page1 occupies address space used by CGA video memory.
DO NOT switch to this page if an EXPANSION CGA adapter
is installed. Hardware damage to the EXPANSION card and/
or the PC10/PC20 motherboard may result!

The relevant registers are:

Hercules Enable Register—I/O addr 3bfh

- bit0: 0 — disable setting graphics mode
1 — enable setting graphics mode
bit1: 0 — disable changing graphics pages
1 — enable changing graphics pages

Mode Register—I/O addr 3b8h

- bit1: 0 — disable Hercules mode(default MDA)
1 — enable Hercules graphics
bit3: 0 — video disable
1 — video enable
bit5: 0 — blink disable
1 — blink enable
bit7: 0 — Hercules Page0
1 — Hercules Page1

Hercules 6845 CRTIC parameters:

register #0	36h
#1	2dh
#2	2fh
#3	07h
#4	5bh
#5	00h
#6	57h
#7	57h
#8	02h
#9	03h
#a	00h
#b	00h
#c	00h
#d	00h

Locating specific pixels within the bitmap may be performed with
the following equation:

$$\text{byte offset} = (8192 * (Y \bmod 4)) + (90 * \text{INT}(Y/4)) + \\ \text{INT}(X/8); \text{bit position} = 7 - (X \bmod 8)$$

where: $0 \leq X \leq 719$
 $0 \leq Y \leq 347$

Plantronics® ColorPlus™ Mode(s)

This mode is an enhancement to the graphics modes of the CGA. The dot clock is 14.318 Mhz in the 640x200 mode and 7.16 Mhz in the 320x200 mode. The 640x200 mode offers a choice of 4 out of 16 colors per pixel vs. black&white in the CGA mode with the same resolution. The 320x200 mode offers 16 out of 16 colors vs. 4 out of 16 colors for the comparable CGA mode.

Plantronics 6845 CRTC parameters:
(actually the same as CGA 320x200 & 640x200)

register #0	38h
#1	28h
#2	2dh
#3	0ah
#4	7fh
#5	06h
#6	64h
#7	70h
#8	02h
#9	01h
#a	06h
#b	07h
#c	00h
#d	00h

The 32Kbytes of display RAM are divided into two bit planes.

Plane0 — Even scan lines @ addr b000:8000h to b000:9f3fh
Odd scan lines @ addr b000:a000h to b000:bf3fh

Plane1 — Even scan lines @ addr b000:c000h to b000:df3fh
Odd scan lines @ addr b000:e000h to b000:ff3fh

3d9: (write only)

- bit 0:—selects blue border color in 40 × 25, 80 × 25 text or 320 × 200 16 colors
—selects blue as background color in 320 × 200 4 colors or 640 × 200 4 colors mode
- bit 1:—selects green border color in 40 × 25, 80 × 25 text or 320 × 200 16 colors
—selects green as background color in 320 × 200 4 colors or 640 × 200 4 colors mode
- bit 2:—selects red border color in 40 × 25, 80 × 25 text or 320 × 200 16 colors
—selects red as background color in 320 × 200 4 colors or 640 × 200 4 colors mode

bit 3:—selects intensified border color in 40×25 , 80×25 text
or 320×200 16 colors

—selects intensified as background color in 320×200
4 colors or 640×200 4 colors mode

bit 4:—selects intensified set of foreground colors in 320×200
4 colors or 640×200 4 colors mode

bit 5:—selects active color set in 320×200 4 colors or
 640×200 4 colors mode

bit 6-7:—unused

3dd:(write only)

bit 0-3: unused

bit 4: 0 = non- 320×200 16 colors

1 = 320×200 16 colors

bit 5: 0 = non- 640×200 4 colors

1 = 640×200 4 colors

bit 6: 0 = Plane 0: b8000 – bffff

Plane 1: bc000 – bffff

1 = Plane 0: bc000 – bffff

Plane 1: b8000 – bffff

bit 7: reserved; always 0

320x200 16 color BIT ORGANIZATION

bplane#	bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
plane0	c1	c0	c1	c0	c1	c0	c1	c0
plane1	c3	c2	c3	c2	c3	c2	c3	c2
pixel#	pixel0		pixel1		pixel2		pixel3	

640x200 4 color BIT ORGANIZATION

bplane#	bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
plane0	c0	c0	c0	c0	c0	c0	c0	c0
plane1	c1	c1	c1	c1	c1	c1	c1	c1
pixel#	pixel0	pixel1	pixel2	pixel3	pixel4	pixel5	pixel6	pixel7

c2/I	c1/R	c0/G	c3/B	color
0	0	0	0	black
0	0	0	1	blue
0	0	1	0	green
0	0	1	1	cyan
0	1	0	0	red
0	1	0	1	magenta
0	1	1	0	brown
0	1	1	1	white
1	0	0	0	gray
1	0	0	1	lt. blue
1	0	1	0	lt. green
1	0	1	1	lt. cyan
1	1	0	0	lt. red
1	1	0	1	lt. magenta
1	1	1	0	yellow
1	1	1	1	bright white

Appendix M

Adding a Hard Disk to a PC10

Using the PC10 with a Hard Disk

Several options are available when considering hard disk storage on a PC10. A hard disk may be added by the usual method of placing a hard disk controller card into the expansion bus and attaching the disk to the card via ribbon cable. The preferred disk form factor is 3½" because it can be added without consuming the space allocated to the existing second floppy drive (Drive B:). If the disk is of the 5¼" form factor it may be mounted below the floppy drive if the second floppy drive is removed.

The 3½" 20Mbyte XT-type hard disk does not require the addition of a controller card, thus freeing one potentially useful expansion slot. The hard drive built into the Commodore PC20 is an XT-type drive.

An XT-type drive attaches to the PC10 motherboard via a 40 conductor ribbon cable. The cable attaches to connector CN202 visible through the opening behind the floppy drive on the floppy/power sub-assembly. An XT-type drive may only be used when no other hard disk controllers/disks are in the system. Before installing the drive, jumper JMP208 must be changed. See Appendix D for information on how to set this jumper for hard disk use.

General Notes on the Use of a Hard Disk

Because a hard disk is extremely shock sensitive, you must use the SHIPDISK program on the MS-DOS floppy disk to "park" (i.e., immobilize) the hard disk heads before moving the computer. You must execute the SHIPDISK command as the final MS-DOS command before you turn off the computer.

When moving the computer from cold places into warm, allow enough time for the hard disk to reach room temperature before turning on the computer. This will ensure that no condensation forms on the hard disk platters.

Formatting Hard Disks

The steps involved in hard disk formatting are:

1. **Low-Level Format**
Actually places special information required by the controller to access the disk (e.g., ID fields and Error Detect/Correct information).
2. **Partitioning**
Links the physical device into the MS-DOS logical device system.
3. **MS-DOS Format**
Formats the logical device in MS-DOS format. (e.g., file structures).

When installing or reformatting an XT-type hard disk like the one in the PC20, the low-level format is performed as follows:

1. At the A> prompt, type:
DEBUG
and press Enter.
2. The prompt will change to a dash (—). When the dash appears, type:
G = FA00:5
and press Enter. The following messages are displayed:
WX2 Format Revision 1.08 © Copyright Western Digital Corp. 1986
Current Drive is C:, Select new Drive or RETURN for current.
Current Interleave is 3, Select new Interleave or RETURN for current.
Are you dynamically configuring the drive—answer Y/N n
Press “y” to begin formatting drive C with interleave 03.

NOTE: *This entry is specific to an XT-type hard disk. Refer to manufacturer's instructions when using other types of hard disks. Answer the **Current Drive** and **Current Interleave** prompts by pressing the Enter key.*

Note that you answer No (n) to the prompt about dynamically reconfiguring the drive. Then press the “Y” key as instructed to begin the low level-format.

When installing a non-XT type of controller/disk, refer to the manufacturer's instructions for low-level format specific to the particular unit.

When you have finished low-level formatting, you must then partition the hard disk. To do this, you use the FDISK command. See Appendix F of the MS-DOS User's Reference manual for instructions on how to use FDISK.

NOTE: When you have finished low-level formatting (using **DEBUG**) or partitioning your drive (using **FDISK**), a message to press a key to reboot will be displayed. **IGNORE THIS MESSAGE!** Instead, press **Ctrl-Alt-Del** or the Reset switch, located on the right side of the System Unit.

When the hard disk has been partitioned, you use the **MS-DOS FORMAT** command to format the partition. To do this, type:

FORMAT C: /V/S

The **/S** option copies the system files from the **MS-DOS System Disk** onto the hard disk. During the formatting process you will see the standard formatting message and prompts, including a prompt for a volume label (disk name). When you respond to this prompt you will see the usual message listing the total disk space and the available disk space, followed by the **A>** prompt.

To start using the hard disk (note that you refer to the hard disk as **C:**), you should first create directories on your hard disk and then copy files to the hard disk directories. (For detailed information on using directories and associated commands, see Chapter 1 of your **MS-DOS User's Reference manual** and the following command descriptions in Chapter 3 of that manual: **CD**, **MKDIR**, **COPY** and **XCOPY**.)

It is suggested that you make a directory called **SYSTEM** and copy the contents of the two floppy disks you received with your computer into this directory. Then use the **PATH** command to reference this directory. The **PATH** command should be placed in your **AUTOEXEC. BAT** file (see the **AUTOEXEC.BAT** file example on page 41). The following three files from your boot floppy disk must be placed in the root directory: **COMMAND. COM**, **CONFIG. SYS**, and **AUTOEXEC.BAT**.

To boot from the hard disk, first be sure to remove the boot floppy disk from **DRIVE A:**. Then reboot the system in any of the following three ways: (1) by pressing **Ctrl-Alt-Del**; (2) by pressing the Reset button, located on the right side of the System Unit; or (3) by turning the computer off and then on again. When the system finishes rebooting from the hard disk, you will see a **C>** prompt instead of the **A>** prompt. You can now access the hard disk drive just as you would a floppy disk drive.

NOTE: If you do not remove the floppy System Disk from Drive A:, the system will boot from the floppy disk in Drive A: rather than from the hard disk.

Appendix N

Technical Specifications

Specification

PC10/PC20

XT Compatible

Memory

ROM

Autoconfig BIOS

RAM

640KB

RAM expandable

on board

n/a

on slots

Yes

CPU

Type

8088-1

Clock speed

4.77, 7.16, 9.54 MHz

8087 Math Co-processor

Socket on board

Number of Slots

Three full size (XT)

Operating System

MS-DOS 3.2 included

KEYBOARD

Number of keys

ASCII 101

International 102

Type

Enhanced AT

Numeric keypad

Yes

Cursor keys

4 – inverted T layout

POWER SUPPLY

Type

High-efficiency switching power supply with integrated cooling fan

Maximum configuration supported

2 floppy disk drives, one hard disk drive, 3 expansion cards

INPUT/OUTPUT PORTS

RS232C serial

Built in

Centronics parallel

Built in

Mouse port

Built in for 1352 Mouse

STORAGE

Floppy drive

Built-in controller supports two drives

Hard drive

BIOS built in for "XT" hard disk interface

Maximum internal configuration

Two half-height 5.25 inch floppy disk drives and one half-height 3.5 inch hard disk drive

VIDEO

CGA

Built in

80 column color alpha/numeric

40 column color alpha/numeric

640 × 200 black and white graphics

320 × 200 4 color graphics

MDA

Built in

80 column monochrome alpha/numeric

Hercules

Built in

720 × 348 monochrome graphics

Plantronics Color Plus

Built in

640 × 200 4 color

320 × 200 16 color graphics

COMPATIBLE MONITORS

TTL monochrome

RGBI

Composite NTSC color

Composite NTSC/PAL monochrome

COMMODORE ADD-ON OPTIONS

Second floppy disk drive

1352 Mouse

MPS 1250 Printer

1084 Monitor

OTHER FEATURES

Sound Capability

External Configuration switches

Built-in real-time clock/calendar with battery back-up

